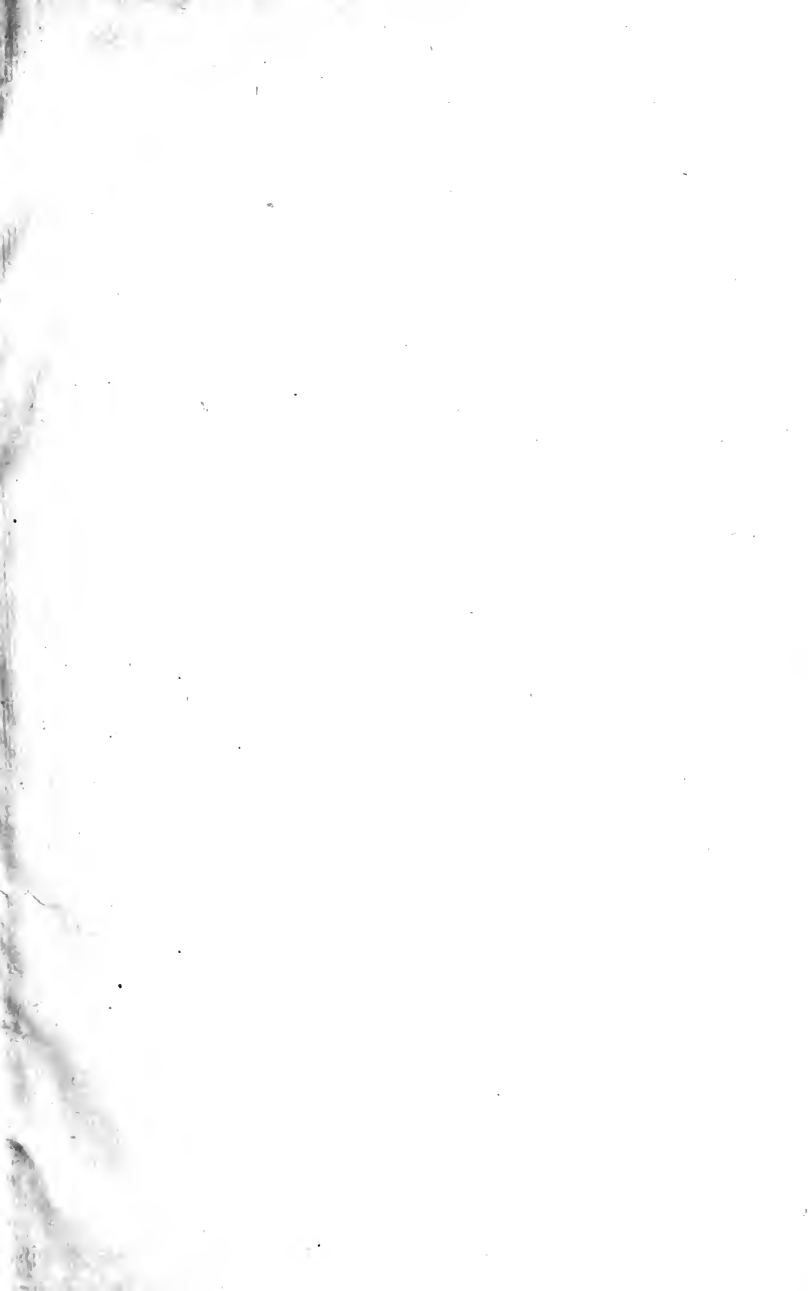
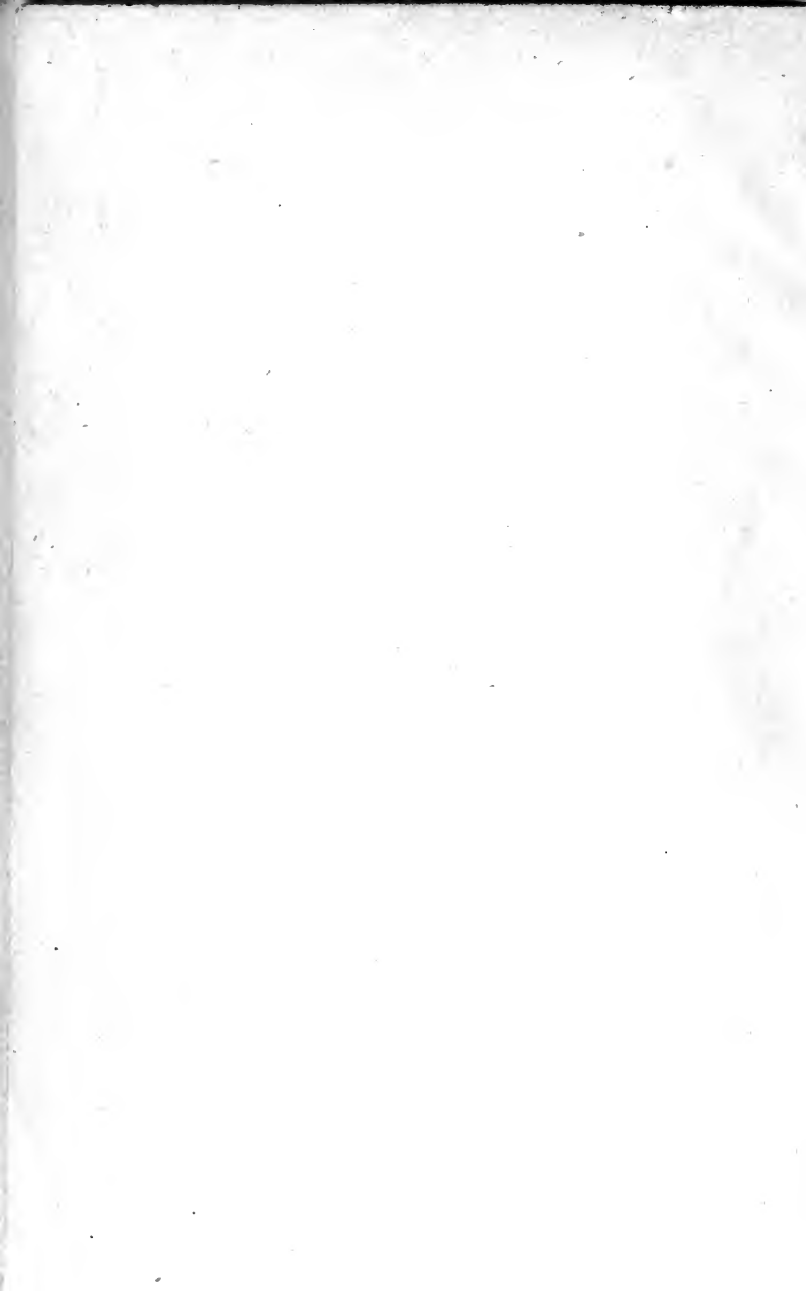




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THE
ART OF DISPENSING

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THE ART OF DISPENSING:

A TREATISE ON

THE METHODS AND PROCESSES INVOLVED IN
COMPOUNDING MEDICAL PRESCRIPTIONS

WITH DICTIONARIES OF ABBREVIATIONS
AND TERMS USED IN BRITISH AND FOREIGN PRESCRIPTIONS,
INCOMPATIBLES AND NEW REMEDIES, AND NUMEROUS
MEMORANDA FOR DISPENSERS AND PRESCRIBERS.

(*FIRST EDITION 1888.*)

NINTH EDITION

(*REVISED AND ENLARGED.*)

By PETER MACEWAN, F.C.S., Pharmaceutical Chemist,
Editor of 'THE CHEMIST AND DRUGGIST.'

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P R E F A C E.

THE history of 'The Art of Dispensing' in book form is graphically represented on the preceding page. But it went through a probationary period before 1888, the germ of it being contained in *The Chemists' and Druggists' Diary* of 1880, which was so well appreciated that the short treatise was augmented for the 1885 *Diary* by extracts from the late Dr. Hermann Hager's 'Technik der Pharmaceutischen Receptur'; then proofs of the combined work were submitted to twelve pharmaceutical chemists in Great Britain, who commented upon the text, and their annotations were appended in small type to the text. There was thus obtained a symposium on this branch of the pharmacist's art which is probably unique in our literature. The varied experience represented in the treatise may be judged by the names of the contributors, who were:—

Mr. J. F. Burnett.
Mr. A. W. Gerrard.
Mr. W. Gilmour.
Mr. Thomas Greenish.
Mr. Joseph Ince.
Mr. Peter MacEwan.

Mr. T. Maben.
Mr. W. Martindale.
Mr. R. H. Parker.
Mr. Barnard S. Proctor.
Mr. J. H. Webb.
Mr. A. C. Wootton.

This treatise was reprinted as a 196-page pamphlet when the edition of the *Diary* was exhausted. The present Editor

rearranged and augmented the work as published in September, 1888, and prepared each succeeding edition for the press.

The book was entirely recast and, in the greater part, rewritten to form the sixth edition, published in 1900, which contained 498 pages, as compared with 288 pages in the fifth edition. A further issue being required, the Editor has carefully revised the work, altering where necessary, and adding considerably. The revision has given an opportunity of rewriting the chapter on new remedies, which have increased greatly in number during the past four years. In the last edition 233 paragraphs were devoted to these (including about 250 remedies), while in this edition nearly 600 remedies are described. The medicinal properties of the substances are referred to in general terms, notes as to physical properties and dosage being regarded as of greater importance to dispensers.

July 4, 1904.

THE NINTH EDITION.

Considerable emendations and additions have been made for this edition. The Editor has been assisted by Mr. Peter Boa in supplying examples of difficulties from current practice. A section on Ampoules has been added, and a Dictionary of Foreign Prescription Terms takes the place of the French and German terms previously contained in the volume. The chapter on New and Unofficial Remedies has again been carefully revised and supplemented by facts respecting those introduced since 1908. In other respects the contents have been made more useful to dispensers and those learning the art.

A reprint of this edition being called for at the time of publication of the British Pharmacopœia, 1914, the Editor has taken the opportunity of making requisite alterations in official data and references.

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THE ART OF DISPENSING.



FIRST PRINCIPLES.

STUDENTS of pharmacy may have observed that 'Dispensing' figures in smallest bulk in the examination schedules of the Pharmaceutical Societies. In that for Great Britain we read that candidates for the Minor certificate are required 'to weigh, measure, and compound medicines ; write the directions in concise language in a neat and distinct hand ; to finish and direct the package.'

The syllabus of the Irish Society is even more laconic, 'to compound and dispense medicines' being all the information vouchsafed to the candidate. This paucity is neither wholly accidental nor wholly intentional, yet when contrasted with the detailed information given in other subjects one is led to inquire why dispensing, the be-all and end-all of the pharmacist as a practitioner, should be treated so barely. The explanation is that every other part of the examination syllabus is applicable and leads up to the subject of dispensing, because this is the art upon which are focussed the pharmacist's knowledge of science, especially of chemistry and materia medica, his intimacy with the Latin language, and his dexterity

as a pharmaceutical manipulator. A fair routine dispenser may get along without such accomplishments, but it is the man who knows the chemical relation of substances to each other who is best able to deal with unusual prescriptions and to dispense the medicine in the form most elegant from the pharmaceutical standpoint and most certain of exerting its full therapeutic action in the time required. These are facts which students of pharmacy should bear well in mind when they are pursuing their scientific studies ; and if they endeavour to piece together what they read or hear in lectures on chemical matters, and what they have done at the dispensing-counter, they will find their understanding of the different subjects become much clearer.

It will be observed that the Irish syllabus requires candidates for the diploma to *compound* and *dispense*. Two distinct actions are implied. In Ireland the men who work at the dispensing - counter are called 'compounders' ; in Great Britain we talk of them as 'dispensers.' The Irish expression is nearer the truth. The dictionaries describe a compounder as 'one who compounds drugs according to a prescription.' The narrow definition of 'dispenser' is the same, but the general meaning is 'one who dispenses, distributes, or deals out,' and in the specific sense the pharmaceutical dispenser is one who compounds drugs according to a prescription and deals the compound out to a customer. The Minor syllabus, in fact, gives the true definition of the art of dispensing, for it is to weigh, measure, and compound medicines according to prescription, write the directions, and finish and direct the package of compounded medicine. It is sometimes called 'extemporaneous pharmacy,' an expression which at least serves to show that the dispenser who receives a prescription to dispense must bring to bear upon it without hesitation the scientific knowledge and manipulative skill which he has acquired through learning and practice.

The prescription is the order of the medical attendant of the patient to the dispenser for the supply of a remedy. In this country the medicinal ingredients are usually written in

Latin, prefaced by the sign *R*, which may originally have implied an invocation to Jupiter, but is now regarded as a contraction for *Recipe*—‘take thou.’ The quantities are expressed by the old apothecaries’ signs for ounce, drachm, scruple, grain, and minim ; the directions as to compounding, in abbreviated Latin, and instructions as to administration, most frequently in English after the abbreviation *Sig.*, complete the prescription. This book does not profess to deal with the construction or rendering of prescriptions, and throughout its pages the initial sign *R* and the final directions after *Sig.* are omitted, although the latter may occasionally be given if the directions in any way elucidate points which the prescriber’s style may leave doubtful.

PROPERTY IN PRESCRIPTIONS.

Certain considerations in respect to prescriptions may here be discussed. The property in the prescription is occasionally doubtful, some saying that as it is the order of the physician to the dispenser, the property in it does not pass to the patient. This is erroneous, because a prescription is rarely what the law of contract considers to be an order for the supply of goods. If the physician, say Dr. Brown, gives his patient, Mr. Smith, a prescription to take to Mr. Jones, a chemist, who supplies Mr. Smith with the medicine, and gets payment for it from Dr. Brown, the prescription is an order,¹ and Mr. Jones may legally keep possession of it until Dr. Brown pays. The prescription then ceases to be requisite as proof of Dr. Brown’s obligation to pay, and might be treated as most orders are under such circumstances—that is, destroyed—were it not that it may have intrinsic value as a prescription. As such Dr. Brown might reasonably demand its return ; therefore it is always advantageous, when such arrangements as that between Dr. Brown and Mr. Jones are entered into, that an understanding should be come to regarding this matter.

¹ This is the legal position of National Insurance Act prescriptions, which panel chemists retain, and present to the Insurance Committee as proof for payment.

Such arrangements, though common, form the smaller proportion of prescription-giving, it being more general for the patient to consult the physician, who gives advice or a prescription in return for his fee, so that the prescription becomes the patient's property, to have and to use within reasonable limits. It would be unreasonable for a patient to get a prescription from Sir Lauder Brunton for, say, a digestive derangement, and offer the medicine to all and sundry as Sir Lauder Brunton's Indigestion-cure. The prescriber in this case would have just cause for legally restraining the patient, or even for securing monetary reparation, because the implied agreement between the prescriber and the patient was solely in respect to the treatment of the latter.

When the prescription is taken to the dispenser it is in some cases retained, especially when the prescriber directs the patient to go to a particular chemist. If the prescription is one which any chemist could dispense, its retention would be considered illegal, unless the patient were informed before he received the prescription that it was to be retained by the chemist. But this only seems to emphasise the rule that the prescription is the patient's property, for he may have it dispensed by a chemist who will willingly return it to him ; although the patient thus risks losing the prescriber's services.

Copying Prescriptions.—Another point in regard to the property in prescriptions arises when they are copied, and this may usefully be prefaced with some remarks regarding the law as to copying. The Pharmacy Act of 1868 and the Irish Pharmacy Act require prescriptions containing poison to be copied. The former Act (Sect. xvii) says that the provisions as to labelling poisons with the name of the poison and the word 'Poison' shall not apply to 'any medicine supplied by a legally qualified [medical practitioner] to his patient, nor to any article when forming part of the ingredients of any medicine dispensed by a person registered under the Act, provided such medicine be labelled with the name and address of the seller, and *the ingredients thereof be entered, with the name of the*

person to whom it is sold or delivered, in a book to be kept by the seller for that purpose.'

It is, therefore, obligatory on the chemist to *enter* in his prescription-book any prescription containing any scheduled poison which he dispenses, and medicine so entered need not be labelled 'Poison.' The only doubtful point about the provision is as to whose name should be entered in the prescription-book. In practice the name of the patient is entered, and that is the most convenient method for subsequent reference ; but that this is not always legally sufficient is apparent when the medicine is for an infant, to whom it cannot be sold or delivered. Therefore the name of the purchaser or his agent should always be entered in the prescription-book as well as the name of the patient for whom the medicine is intended. On this point see p. 19.

In the Case of Repeats of medicines containing scheduled poisons it is not considered necessary to recopy the whole prescription, but to make such an entry as—

Mrs. Thomas William Jones.

Repeat ʒviij . arsenical mixture as prescription,
Book F, No. 1793. June 20, 1899.

It will be noticed that the address of the person to whom a dispensed medicine is sold or delivered is not required by law. It is customary in some pharmacies where the prescriptions of certain physicians are retained to file them all, and the entering in the book of those containing poisons may be overlooked. This would be an illegal practice, apart from which the non-entry of prescriptions is poor business, because prescription-books may become a valuable trade asset.

The Prescription-book need not be an elaborate affair unless the work to be done is voluminous. In some pharmacies a prescription-register is also kept, and on page 6 we reproduce the ruling of a register for which the advantages claimed are : It shows (1) the amount of dispensing done in a day, week,

month, or year ; (2) the nature of the medicine dispensed ; (3) the hour when dispensed (this is a check upon delivery should the messenger have wasted time) ; and (4) the names of the dispenser and checker. We note the width of each column :—

Date	Name	Address	Medicine	Number	Hour	Dispensed by	Checked by
Feb. 5	Betsy Jones	Glad- stone Place	6-oz. mixture	42,356	10.50	A. B.	C. D.
$\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	$1\frac{1}{8}$ in.	1 in.	1 in.	$\frac{3}{4}$ in.	$\frac{3}{4}$ in.	$\frac{3}{4}$ in.

Much may be said against methods of registration if they are employed simply with the object of impressing customers with the idea of your carefulness. Remember that every effort should be made to attain *absolute* correctness in dispensing and promptitude in delivery of medicines ; perfect satisfaction is thus guaranteed, and complaints will be extremely rare. If the prescription-records have to be often referred to for the purpose of detecting culprits, this only proves that all precautions have failed to put the dispensers on the alert, or that they have made the dispensers tools of the system or dependent upon it. Mistakes should *never* be allowed to occur, and the most certain indication of accurate dispensing and careful checking is that the prescription-register rarely requires to be reopened. Good general supervision by the principal for the time being should never be neglected.

It is advisable to enter every prescription and repeat in the prescription-book, for in the event of the business coming into the market for sale, the books may enhance the selling-price. In such sales the prescription-books become the property of the purchaser as part of the business. This brings us to a legal consideration already referred to, namely :—

GIVING COPIES OF PRESCRIPTIONS.

A subscriber to *The Chemist and Druggist* once asked, 'Has a customer a right to demand a copy of a prescription from a pharmacist?' He had in his books a copy of a prescription entered in 1860. The original owner had been dead

three years, and a member of his family asked for a copy to circulate and do good in a neighbourhood ten or twelve miles away. There being some doubt about the matter, the question was submitted to several experienced pharmacists, and the following paragraphs are the gist of their replies :—

The late Mr. F. Andrews (London) was of opinion that it would be perfectly right to decline to give a copy.

The late Mr. Eve (of Messrs. Allen & Hanburys) said the copies of prescriptions are only made for a definite legal purpose and confer no right upon the owner. When copies have become valuable property no reasonable customer would persist in asking for them.

The late Mr. D. Frazer (Glasgow) held that the patient is the owner of the prescription, not the prescriber or the pharmacist. As to the dispenser giving copies of prescriptions entered in his books, each man must judge for himself. The pharmacist should never hesitate to give a copy when requested by the original owner.

The late Mr. W. Gilmour (Edinburgh): Entering a prescription into a prescription-book in no way invests the chemist with any proprietary right in it. Mr. Gilmour added that he would not take the responsibility of trading in any prescription or of giving a copy of it to any but the original holder, or at his request.

The late Mr. Thomas Greenish, then President of the Pharmaceutical Society of Great Britain, wrote: Prescriptions are copied at the expense of the pharmacist, who has a sole right to the copies, the original prescription only being the property of the patient for whom it was written. To give a copy is a matter of courtesy.

The late Mr. Joseph Ince said : It is probably not legal that a particular recipe should be retained by the pharmacist. But the book of manuscript copied prescriptions is the property of the dispenser—part of his stock—and can be bought or sold. No one but the original owner has even the claim of courtesy to assert in desiring a copy.

The late Mr. W. Martindale (London) : The only persons who can show a title of claim to a copy of a prescription copied in a chemist's prescription-book (and these only by favour) are

the prescriber and the patient. If both prescriber and patient are dead, the copy is ethically the chemist's *in toto*. The copy is no longer a prescription.

The late Mr. R. Reynolds (Leeds) said the chemist might refuse to give a copy of the prescription without anyone having a remedy at law against him. To give away valuable parts of his prescription-books, bought as part of the goodwill, would be damaging his future and drawing upon his capital.

The late Mr. G. F. Schacht considered the original prescription itself to be the property of the patient, and the copy of that prescription in the chemist's book to be the property of the chemist. The chemist could scarcely refuse to give a copy to the patient ; but when the latter dies the chemist's one and-only obligation ceases, and it rests entirely upon his judgment and his courtesy whether he shall part with a copy to anyone.

The late Mr. W. Southall (Birmingham) said : The copy of a prescription is an assistance to memory, in which no one can claim any right or property but the copyist. The original holder of the prescription has no ownership in the copy. On the other hand, a chemist has no right to dispense any prescription of which he may possess a copy, as being Mr. So-and-so's, without the owner's permission.

Dr. C. Symes (Liverpool) wrote : As a matter of courtesy it is well to give a copy of a prescription when it is required for a legitimate purpose, always holding the right to refuse it if required for the furtherance of quackery or for use to the direct prejudice of the pharmacist possessing it.

Our Legal Contributor brought to bear upon the question the stern views of property, which dispensers are so apt to forget in the handling of prescriptions. He said : The chemist does not acquire the right to use the property of a patient (whose prescription he has copied) as part of his stock-in-trade, for the purpose of making money thereby. The customer has no right to demand a copy from the prescription-book on the ground that he has lost the original prescription. If a customer allows the chemist to use the medicine for various purposes

and to take the profit arising from the sale thereof, and this continues for a long course of years, in the absence of any proof to the contrary it would be assumed that the owner had given the chemist a general right to make up the medicine for his own profit.

It is not difficult to deduce from these opinions (which still express the common view) two sound business tenets :—

(1) The chemist's prescription-book is his own property, created, apart from legal obligations in regard to poisonous remedies, for the purpose of facilitating business with those for whom he originally dispensed the prescriptions.

(2) It is permissible, in some cases advisable, to give copies of the prescriptions to the original holders thereof, but it is not advisable to give copies to others.

Generally, it may be said that it is unwise to encourage the use of a medicine prescribed for one individual by others who suppose that they suffer from the same complaint. It may do harm, and the custom is unfair to prescribers. There are exceptions, it is true, for in most towns some Mr. Smith's tonic-mixture or some Mr. Jones's liver-pills are to be found which are popular long after the death of the prescribers and the original patients. But in such cases we really pass from the dispensing to the retail counter. These general considerations on the legal aspects of the prescription need not be extended here to other points, such as the use of poison-bottles, which are treated later.

Students will observe that in this book, after general principles are expounded, solid forms of medicines are treated first, then those which are administered or used in liquid form. Originally 'The Art of Dispensing' was intended solely as a reference-book for the dispensing-counter, but it has become a popular educational work. It would be possible, no doubt, to systematise the information so that the student might work gradually from elementary compounding to that of the most intricate nature. The Editor is convinced that this would be detrimental to the utility of the book, while it would be an encouragement to theoretical dispensing.

GENERAL SUGGESTIONS.

The Dispenser must cultivate habits of order and cleanliness in respect to his person as well as in his methods of work. Dirtiness and untidiness in dress on the part of the dispenser give an unpleasant impression. Such practices as pressing corks with the teeth, holding powder-envelopes in the mouth, shaking up mixtures with the finger over the mouth of the bottle, and breathing on pills to be silvered should be avoided. Becoming manners and decorous conduct in the pharmacy are essential; anything in the nature of joking is out of place, because if observed by customers, who usually feel that they are on a serious errand, distrust may be created. Dispensing is the most responsible part of the pharmacist's duties, and is considered to be so by doctors and patients alike; the closest attention and the most scrupulous care should therefore be manifested at the dispensing-counter.

Quality of Drugs.—The medicines employed in the preparation of prescriptions should be of the finest quality procurable for money, and official or other preparations made from them should be prepared in strict accordance with recognised methods. Second qualities of some goods may be necessary for certain purposes in other sales, but the pharmacist should not for a single moment permit the thought of second qualities in the dispensing department. Differences will occur in medicines prepared at different establishments, but always at least retain the satisfaction of knowing that these cannot result from the use of inferior drugs in *your* pharmacy. Let the consideration of profit gained from the dispensing of prescriptions be secondary: it will take care of itself. Dispense medicine with the feeling that an artist has in his work, and so will you

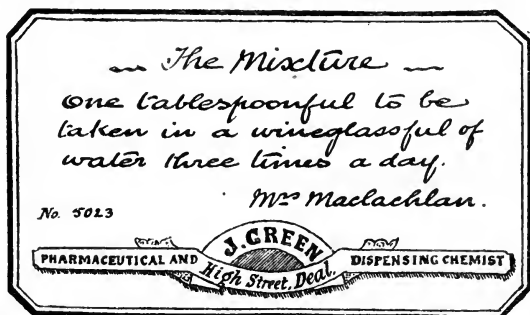
make an art of yours. Ensure by occasional testing that preparations which are liable to deteriorate are of proper strength ; this applies particularly to such as acid. hydrocyanic. dil. and spt. æther. nitrosi. Although you pay the best price for your drugs, do not let that prevent you submitting them to examination before placing them in stock.

Style in Externals.—The pharmacist, however, may lose all the pecuniary benefit of his conscientiousness if, after paying the best price for drugs, he should be deficient in style in sending them out. The dispenser who economises on his drugs is a rogue, but he who economises on his bottles, corks, pill-boxes, or paper is a fool. Customers can only judge by the externals, and generally they would be right in concluding that a man who sends out medicine in a low-class bottle with a brittle cork may have used drugs of equally low quality. Evidence of slovenliness on the outside of a packet does not encourage faith as to the care with which the contents have been compounded. Good taste may be shown in labels as well as in the boxes, bottles, &c., upon which they are placed. Let the direction to the patient, and not your own name and address, be the most prominent part of the label. Have a nice neat label for the dispensing department, with as little as possible upon it beyond your name, qualification, and address.

On this subject Professor Remington remarks that 'neatness, distinctness, and simplicity are cardinal principles in designing labels, and the reputation of many establishments is frequently judged from the character of the outward signs of neatness and care. For this reason particular attention should be paid to prescription-labels, not only to have the printed address plain, clear, and neat, but to have the handwriting to correspond. In these important particulars patients are exceedingly apt to form an estimate of the qualifications of the compounder of a prescription from the style of his penmanship, reasoning that if he is careful, clean, and neat in the one particular of which they are competent to judge—*i.e.*, the handwriting on the label—the compounder must exercise similar

qualifications in the more vital operations involved in compounding and dispensing, for upon the technicalities of the latter they cannot hope to pass judgment.'

A Few Examples of Labels will serve to show both good taste in printing and the requisite elegance in writing the directions. The first specimen is a design which secured a first prize from *The Chemist and Druggist* for distinctness. This label exhibits with fair accuracy what an authority has put down as a cardinal principle in writing directions upon a label—viz., to balance the matter so that its parts may form a symmetrical arrangement. All the lines should begin and terminate at the same distance from the margin. If we write



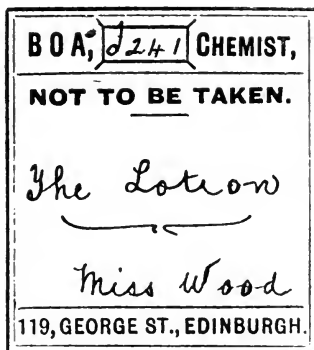
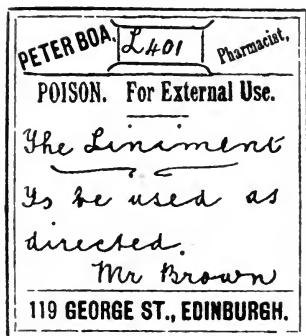
'The Mixture' or 'The Powders,' we must take care that the words are in the centre, for the appearance of a label is greatly marred by having this superscription nearer to one side than the other. The dispenser should also be careful to adjust the matter so that it may fill the label fairly well. A label with a third of it at the top occupied by writing and the lower space blank looks bad. It is in this connection that a middling writer who has an eye for proportion in form may surpass a good writer in execution of a label. The free-and-easy writer too often trusts so much to the excellence of his penmanship that he altogether neglects the proper apportionment of the parts of the directions.

An Irish pharmacist, commenting upon this specimen

(C. & D. xlviii. 75), remarked that it is a capital example of what a label should be, and he gave the useful hint that the writing should be allowed to dry, which recalls the fact that



the best dispensers write the label for a prescription the first thing after reading it, and before they begin the compounding, so that the handwriting is dry and fast when the medicine is ready for the label. The most famous dispensing houses



use exceedingly plain dispensing-labels. We are indebted to the principals of several establishments for the specimens which we give, the directions having been written by members

JOHN BELL & CO. *B.N.*
PHARMACEUTICAL CHEMISTS. //

*An eighth part to be
taken three times a day
Mrs. Smith*

225, OXFORD STREET, *Opposite* GT. PORTLAND STREET.



The Syrup

*A small teaspoonful to be
taken two or three times a day
in a little water after meals.*

Copied R. 473 M. Robinson

ALLEN & HANBURY'S LTD
14ough Court, Lombard St. *7 Vere St, Cavendish Sq.*
LONDON. E.C. **LONDON. W**
A.D. 1918.

of the staffs, but in the case of Messrs. Allen & Hanburys' label the writing on the original is in lithographic facsimile.



The following is a style of label which suits dispensing-businesses where the physicians' prescriptions are kept and filed, which is practically universal in the United States. The special advantage of the label is that when used on a square bottle the directions face the reader, and there is no possibility

THE MIXTURE.

A Tablespoonful
to be taken
three times a
day, after meals.
Miss Jones

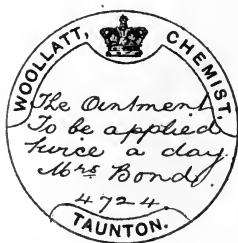
FROM PETER BOA,
119, GEORGE STREET,
EDINBURGH

M/123

<p>RICHARD H. ROE, GRADUATE OF THE COLLEGE OF PHARMACY OF THE CITY OF NEW YORK, 2047 FOURTH AVENUE, NEW YORK.</p>	<p>DIRECTIONS:</p> <p>For</p> <p>Dose</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>Prescription No.</p> <p>Dr.</p> <p>Date 19 ..</p>
--	--	--

of complicating reference-matter with directions. We should prefer the label if it were turned round, bringing the blank lines parallel with the chemist's name, and instead of 'Directions' using the words 'The Medicine.'

It is desirable to have more than one kind of dispensing-label, so that if more than one internal remedy is dispensed for a patient, or if there are two or more patients in one family, there may be distinctiveness. In round labels there is little room for variety, but in this case it is all the more important, owing to the small space for directions, to have little room wasted on the name and address. We give two specimens of round labels, one of which shows what the typewriter can do. It was suggested some years ago that typewritten labels should be adopted, but the idea never caught on:—



The foregoing examples show several styles of handwriting. The ability to write neatly is an essential part of the Minor candidate's qualification (see page 1). Bad penmanship is sometimes regarded as a sort of natural defect, and a good many people pride themselves upon it. Some perseverance, however, is all that is necessary to make a bad writer into a good one, and the youth who will not take the trouble to cultivate this first branch of his art had better abandon any thought of fitting himself to become a dispenser of medicines.

Labels should always be neatly trimmed by carefully cutting off with a pair of scissors the surplus paper at the margin.

Many pharmacists omit to do this, although it adds greatly to the 'finish' and elegant appearance.

The rare, but not unknown, practice of placing a fresh label over an old one to save the trouble of removing it should on no account be permitted. Apart from its slovenliness, such a habit may produce, and has produced, mistakes from the accidental removal of the top label and exposure of another unlike it in nature or dose. At any rate, the recognised rule in all good pharmacies is to take a clean bottle each time a prescription is dispensed. A customer now and then objects to his bottle being changed, but that is the exception which proves the rule.

'**Poison**,' 'Shake the bottle,' and other adventitious labels are best placed at the shoulder of the bottle. If placed at the foot, the hand holding the bottle may cover them, or a hurried person may overlook them : at the shoulder they will be read first. Moreover, it frequently happens that the patient will only tear off the upper part of the wrapper ; hence a label at the bottom of the bottle in this case would be of no avail, because not seen. Another plan which is equally efficient, and neater, is to have 'Poison' and 'Shake the bottle' printed on the labels. One series of lotion-labels may be had with 'Poison' at the top, and another series without. In the same way, mixture-labels may be had of two series—one with a plain 'The Mixture,' and the other with 'Shake the bottle before using' printed immediately below 'The Mixture,' or at the bottom of the blank space. Many dispensers, however, follow the practice of placing the 'Shake the bottle' label near the bottom of the bottle, on the principle that, being further away from the label with the direction, it is likely to receive distinct attention ; and when it is necessary to use both a 'Poison' and a 'Shake' label on the same bottle, the latter placed at the bottom and the former midway between it and the label proper forms a distinctive and symmetric arrangement. Orange-coloured paper is very commonly used for poison-labels, and is undoubtedly very distinctive ; but it has the disadvantage

that when used for oleaceous liniments the labels are apt to get stained, and the stains almost obscure the printing and writing. White paper with the border and name and address in red, and the wording 'Not to be taken,' or whatever it be, in black, makes a label free from this objection.

The **Poison Regulations** of Great Britain now require that embrocations, liniments, lotions, and liquid disinfectants containing poisons shall be sent out in bottles 'distinguishable by touch.' By this is meant one or other of the poison-bottles. The regulations are as follows :

Regulation 1.—That in the keeping of poisons, each bottle, vessel, box, or package containing a poison be labelled with the name of the article, and also with some distinctive mark indicating that it contains poison.

Regulation 2.—Also that in the keeping of poisons, each poison be kept on *one or other* of the following systems, viz. :—

(a) In a bottle or vessel tied over, capped, locked, or otherwise secured in a manner different from that in which bottles or vessels containing ordinary articles are secured in the same warehouse, shop, or dispensary ; or

(b) In a bottle or vessel rendered distinguishable by touch from the bottles or vessels in which ordinary articles are kept in the same warehouse, shop, or dispensary ; or

(c) In a bottle, vessel, box, or package kept in a room or cupboard set apart for dangerous articles.

Regulation 3.—That in the dispensing and selling of poisons, all *liniments, embrocations, lotions, and liquid disinfectants containing poison* be sent out in bottles rendered distinguishable by touch from ordinary medicine-bottles, and that there also be affixed to each such bottle (in addition to the name of the article, and to any particular instructions for its use) a label giving notice that the contents of the bottle are not to be taken internally.

It is common to dispense lotions in flat bottles of green glass corrugated at the back, and embrocations and liniments in the hexagonal cobalt-blue bottles. If registered chemists and druggists and limited companies in Great Britain do not use these or other distinctive bottles for the medicines specified, they render themselves liable on conviction to a fine of 5*l.* for each offence. Registered medical practitioners are exempt.

POISONS SCHEDULE (GREAT BRITAIN).

In dispensing any medicine containing any of the substances mentioned in the following schedule, registered chemists, apothecaries, and medical practitioners in Great Britain do not require to label the medicine 'Poison' (in Ireland medical practitioners must label), but the name and address of the seller must be given in all cases. The ingredients of prescriptions containing any scheduled poison must be entered with 'the name of the person to whom it is sold or delivered in a book kept for that purpose.' The name of the person for whom it is sold (*i.e.*, the patient) or of the person to whom it is delivered (*i.e.*, the patient's agent) may be entered, said Mr. Justice Lush in '*Berry v. Henderson*,' a legal case which bears upon the matter. In the Poisons Act (Ireland) these conditions were applied to apothecaries, and the 1875 Act extended them to pharmaceutical chemists and legally qualified medical practitioners. It should be noted that prescriptions containing arsenic are only subject to the dispensing exemption when they are written by a duly qualified medical practitioner.

Part I.

(Each sale by retail must be entered in the poison-book in the statutory manner.)

Arsenic, and its medicinal preparations.	Coca, any preparation or admixture of, containing 1 or more per cent. of coca alkaloids.
Aconite, aconitine, and their preparations.	Corrosive sublimate.
Alkaloids—All poisonous vegetable alkaloids not specifically named in this schedule, and their salts, and all poisonous derivatives of vegetable alkaloids.	Cyanide of potassium, and all poisonous cyanides and their preparations.
Atropine, and its salts, and their preparations.	Emetic tartar, and all preparations or admixtures containing 1 or more per cent. of emetic tartar.
Belladonna, and all preparations or admixtures (except belladonna plaisters) containing 0·1 or more per cent. of belladonna alkaloids.	Ergot of rye, and preparations of ergots.
Cantharides and its poisonous derivatives.	Nux vomica, and all preparations or admixtures containing 0·2 or more per cent. of strychnine.
	Opium, and all preparations or

admixtures containing 1 or more per cent. of morphine.

Picrotoxin.

Prussic acid, and all preparations or admixtures containing 0·1

or more per cent. of prussic acid.

Savin and its oil, and all preparations or admixtures containing savin or its oil.

Part II.

Almonds, essential oil of (unless deprived of prussic acid).

Antimonial wine.

Cantharides, tincture and all vesicating liquid preparations or admixtures of.

Carbolic acid, and liquid preparations of carbolic acid and its homologues containing more than 3 per cent. of those substances, except preparations for use as sheep-wash or for any other purpose in connection with agriculture or horticulture contained in a closed vessel distinctly labelled with the word 'Poisonous,' the name and address of the seller, and a notice of the special purposes for which the preparations are intended.

Chloral hydrate.

Chloroform, and all preparations or admixtures containing more than 20 per cent. of chloroform.

Coca, any preparation or admixture of, containing more than 0·1 per cent. but less than 1 per cent. of coca alkaloids.

Diethyl-barbituric acid, and other alkyl, aryl, or metallic derivatives of barbituric acid, whether described as veronal, proponal, or by any other trade name, mark,

or designation, and all poisonous urethanes and ureides.

Digitalis.

Mercuric iodide.

Mercuric sulphocyanide.

Oxalic acid.

Poppies, all preparations of, excepting red-poppy petals and syrup of red poppies (*papaver rhœas*).

Precipitate, red, and all oxides of mercury.

Precipitate, white.

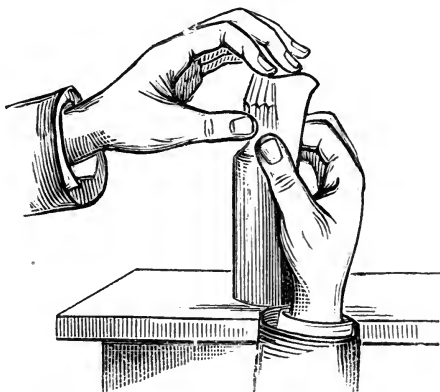
Strophanthus.

Sulphonal and its homologues, whether described as trional, tetronal, or by any other trade name, mark, or designation.

All preparations or admixtures which are not included in Part I. of this schedule, and contain a poison within the meaning of the Pharmacy Acts, except preparations or admixtures the exclusion of which from this schedule is indicated by the words therein relating to carbolic acid, chloroform, and coca, and except such substances as come within the provisions of Section 5 of this [1908] Act [hydrochloric, nitric, and sulphuric acids, soluble oxalates, and ammonia solutions (over 5 per cent.)].

The schedules for Ireland and other parts of the British Empire differ in details, but the principles for dispensing and selling are the same.

Capping Bottles.—In capping bottles with leather it is a good plan to soak the leather for a short time in lime-water, or even in plain water. Crimson paper is generally used for capping (in the manner shown in the accompanying figure), but it has now largely given way to ready-pleated caps. The cap should be secured with a small indiarubber band, as it can be most readily removed in that way ; but if secured with twine, form a loop knot, so that twine and



HOW TO MAKE A PLEATED PAPER CAP
EXTEMPORANEOUSLY.

cap may be easily removed. On the whole, finishing off without a cap is better than with it, from the patient's point of view, and an embossed or printed circular address-label for the top of the cork is better than a heavy sealing-wax finish, although the latter has the more substantial appearance.

One Thing at a Time.—Never have two prescriptions going at once. Of course, if there is an infusion to make, you will set that on—set the jar on one side, marking on a piece of paper what it is and the time when it will be ready ; then place this label between the cover and the rim of the jar. You can then go on with another prescription. But, having finished one, clear up all disorder, and put away bottles, measures, and mortars, before beginning anything else. Indeed, bottles should be replaced, and measures and mortars set aside for cleaning, directly after being used, and should on no account be allowed to accumulate on the dispensing-counter. A suggestion to 'place together on the counter all shop-bottles containing the ingredients for the prescription'

was unanimously condemned by experienced pharmacists in *The Chemist and Druggist*, October 1, 1906, p. 555.

Checking.—It is desirable that one person should copy the prescription, write the labels, and dispense the medicine. The copying should always precede the dispensing, and the dispenser will then have acquired a general acquaintance with the prescription. If the staff is large enough, it is a very good plan for a second person to examine the medicine, compare the labels with the prescription, and finish off. In any case, the dispenser should never let the medicine leave him without making a final reading of the prescription, concentrating all his attention on it, and considering whether he has exactly followed the instructions. Then he should compare the medicine which he has compounded with the prescription; noting the colour of the medicine, smelling it, tasting it if that is appropriate, and observing whether there is a sediment or not. All these points are good to observe, and when they are regularly practised they are a valuable precaution. In the best dispensing houses each weighing or measuring of a poison is checked by a second dispenser.

Precautions.—It is a common plan in large dispensing establishments to use duplicate numbers for the dispensing department. A certain number is given to the person ordering the medicine, and a corresponding one is attached to the prescription, so as to guard against the possible occasional delivery of the wrong medicine.

Another method of carrying out the same precaution is to attach to the prescription, and then to the finished medicine, a printed form, something like this :—

Prescription received	.	.	.	.	.	3.10 P.M.
Medicine ready	.	.	.	.	.	3.30 „
Delivered to messenger	.	.	.	.	.	4.0 „

The advantage of this was demonstrated in the case of a messenger who, having wasted several hours on his errand and

delivered the medicine after the patient had died, pretended that he was detained by the pharmacist, but his false statement was refuted by a label like the above.

Another good method is the use of a small adhesive label, marked 'Immediate' in very bold type, as here shown. This is placed outside the parcel in the most prominent position, so that it cannot fail to catch the eye of the messenger and of the person to whom the medicine is delivered at the house. This label should only be used for parcels of special urgency and those promised for delivery at a certain hour.

IMMEDIATE.

Order received at
Sent out at

A more elaborate plan is to have a series of coloured tickets to attach temporarily to prescriptions, and ultimately to the parcels containing the medicines, so that dispensers, finishers, packers, and counter-men may be guided by them. A scheme like the following is used in one of the largest British dispensing departments :—

Crimson, implying urgent precedence, so as to dispense and despatch as quickly as possible.

Green, implying to be called for.

Yellow, implying despatch by own messengers.

White with scarlet crossbar, implying despatch by first parcel-post.

Each of the tickets bears the name of the customer and brief directions as to delivery. Another good idea is to attach a small label to each box, bottle, pot, &c., initialed by the dispenser, and also by the checker, previous to wrapping it up and sending it out. Thus :—

Dispensed by A. B.

Checked by C. D.

The advantages of this plan are (1) probability of detecting any serious blunder, and (2) checking by a superior acts as a deterrent to slurring the dispensing in any way.

WEIGHTS AND MEASURES.

IN the British Empire the weights and measures most commonly employed for dispensing-purposes are those of the Imperial system and the old apothecaries' weights and measures. The unit of weight in each is the same—namely, the grain, an entirely arbitrary but exceedingly convenient unit. In the United States of America similar systems are in use, but the standards employed there are those originally introduced from England when the United States was a British Colony; and as many changes have since been made in our Imperial system, there are differences between the American and British standards, although the designations may be the same. The differences between the two systems are in measures and higher weight denominations than the grain, which is the same in both.

The United States standard for measure is the old wine-gallon, used in England before 1826; this gallon being 231 cubic inches in capacity. It is divided into 8 pints, each of 16 ounces; the ounce is divided into 480 minims, and a minim of pure water at 22° C. weighs 0.9483 grain.

The Imperial gallon is the measure, at 62° F. and normal pressure, of 10 pounds, or 70,000 grains, of pure water—that is, a volume of slightly over $277\frac{1}{4}$ cubic inches. It is divided into 8 pints, each of 20 ounces, the ounce being divided into 480 minims; and a minim of pure water at 62° F. weighs 0.9114 grain, so that 50 Imperial minims equal 48 American minims.

The Imperial ounce is $437\frac{1}{2}$ grains, but the American is

455'7. The apothecaries' system is used in both countries, and the weights are the same—that is, one apothecaries' grain is equal to one avoirdupois grain in both, and the scruple equals 20 grains, the drachm equals 60 grains, and the ounce equals 480 grains—Americans generally speak of it as the 'Troy ounce,' Britishers saying the 'apothecaries' ounce' or 'Troy ounce' according to the trade in which it is used.

It is the custom in the British Empire and in the United States, when dispensing, to weigh solids and measure liquids, and that is the rule of this book.

Signs.—The weights and measures signs employed in prescriptions are—

℥, ounce = 480 grains by weight or 480 minims by measure.

℥, drachm = 60 „ „ „ „ 60 „ „ „ „

℥, scruple = 20 „ „ „ „

gr., grain.

℥, minim = $\frac{1}{480}$ of one ounce by measure, equal in pure water to $\frac{10}{4375}$ of the avoirdupois ounce.

C., Congius or gallon of 160 ounces (British) or 128 ounces (American).

O., Octarius or pint „ 20 „ „ „ 16 „ „ „

lb, Libra or pound of 12 Troy ounces.

lb., „ „ „ „ 16 avoirdupois ounces.

The last four signs are rarely employed in prescriptions.

Probably owing to the fact that the retailing and dispensing of drugs go on simultaneously in the same pharmacies, also on account of the fact that few dispensing chemists have sets of apothecaries' weights over the ℥ij., while all have complete sets of avoirdupois or Imperial weights, doubt is frequently expressed as to what the signs in prescriptions imply. Once upon a time apothecaries' weights alone were employed in compounding drugs, but the British Pharmacopœia adopted the Imperial system, and in 1877 the late Dr. Redwood, then an editor of that Pharmacopœia, gave an authoritative and reasonable explanation of what is to be understood by the various signs for weights and measures. He pointed out that the British Pharmacopœia adopts the avoirdupois weights, and

the signs employed—lb., oz., gr.—apply to the weights of this system. The other signs— \mathfrak{D} , \mathfrak{z} , \mathfrak{ss} , lb—however, mean what they always meant—namely, the scruple, drachm, ounce, and pound of the apothecaries' system. Difficulties can only occur in the ounce and pound. Strictly speaking, therefore, it should be understood that ' \mathfrak{z} ' means an apothecaries' or Troy ounce of 480 grains, while 'oz.' means an avoirdupois ounce of $437\frac{1}{2}$ grains. So 'lb' is the Troy pound of 12 Troy ounces, and 'lb.' is the avoirdupois pound of 16 avoirdupois ounces. These signs were recognised by the British Pharmacopœias until 1914, when the Imperial weights and measures gave way to the metric system except in statements of doses. In the preface to the British Pharmacopœia, 1864, the following statement was made :—

All who prescribe and dispense medicines are recommended to discontinue henceforth the use of the drachm and scruple weights.

No reference was made to the signs, but this was done in the preface to the 1867 edition, thus :—

It is strongly urged upon all medical men to avoid the use of the terms ounce and pound with reference to any other than the avoirdupois or Imperial standard weight ; but it will be optional with the physician *in prescribing* to use the symbols \mathfrak{D} and \mathfrak{z} , the former representing 20 and the latter 60 grains [if such should be found to conduce to accuracy or convenience]. In the measurement of liquids the Imperial measure is used for the higher denominations, and the fluid ounce and its subdivisions into fluid drachms and minims for the lower denominations, of volume. [These measures are convenient, and have become familiar, having been used throughout the United Kingdom for many years.]

The 1867 preface was reprinted in the 1885 edition, and in the 1898 one the remarks quoted were also reprinted (without the two sentences in brackets) as being 'still applicable.' At the same time the alternative employment of metric weights and measures was 'extended to every official paragraph which makes reference to the usual Imperial weights and measures.' The preface to the 1914 edition states :—

In this Pharmacopœia the Centigrade thermometric scale and the metric system of weights and measures are used for all pharmaceutical and analytical computations. The metric system has also been employed for the specification of doses, in the expectation that in the near future the system will be generally adopted by British prescribers. . . . As a transitional provision doses have also been expressed in terms of the Imperial system. . . . In prescriptions the symbol ʒj is often used to represent 60 grains, and also to represent 1 fluid drachm; and the symbol ʒj to represent sometimes 480 grains, sometimes 437.5 grains, and also to represent 1 fluid ounce. As these symbols are apt to be misread, it is recommended that prescribers should cease to employ them.

The Pharmacopœia of 1885 introduced for the first time the fluid grain, which is the volume of 1 grain of water at the normal conditions of temperature and atmospheric pressure. The metric system is exclusively employed on the Continent, and both liquids and solids are weighed except in France, where the rule 'solids by weight, liquids by measure' is followed. The use of the system is legal in the United Kingdom, and since its recognition by the British Pharmacopœia, 1914, sets of metric weights and measures are requisite for the equipment of every dispensing-counter. It is always preferable, in dispensing foreign prescriptions, to weigh all the ingredients as would be done on the Continent. The tare of the bottle is taken with a quantity of small shot contained in a chip box.

In weighing fluids for a mixture, the German rule is to put the smallest quantity ordered in the bottle first, then the next larger quantity, and so on. The reason is that the delicacy of the scales diminishes with the increased weight, and as the medicines ordered in small quantities are generally the most powerful, they need to be dispensed with the greatest degree of accuracy. When so many drops of a fluid are ordered it is usual to put the drops in first, so that if a few drops too many fall in they can be returned. Fluids up to 1 gramme are generally dropped, and it is reckoned that of the fatty oils, the heavier essential oils, and tinctures, 20 drops = 1 gramme; of other essential oils, chloroform, acetic ether and spirit of ether, and aqueous fluids, 25 drops = 1 gramme; of

ether, 50 drops = 1 gramme. These calculations are not quite accurate, but they accord with the Prussian medicinal tariff, which is understood by the prescriber and dispenser to be a common basis of reckoning.

The rule brings out prominently the superiority of the English system of measuring, and the immense advantage of so small a unit of measure as the minim. The principle of the



HOW TO MEASURE.

Grasp the measure with the thumb and forefinger of the left hand, and bring the second finger under the measure so as to keep it level. The other fingers thus remain free to grasp the bottle-stopper.

rule (taking the smallest quantities first) has its application, however, to our method, the exceptions being where following the rule would give a result not desired. The smaller quantities and thinner fluids should invariably be measured first, or, if this does not quite suit a special method of compounding, they should be measured with a fresh measure-glass. To measure, for example, 1 drachm of hydrocyanic acid in a

measure which has just been used for measuring $\frac{1}{2}$ ounce or 1 ounce of glycerin or syrup of squill clearly courts error. Equally incorrect would it be to start with a 4-ounce measure-glass, however correctly graduated or however suitable for measuring the other ingredients of a prescription, to measure a small quantity of a powerful remedy, such as hydrocyanic acid. Oily liquids—*e.g.*, ext. filicis liq.—should be poured into some of the aqueous ingredient of the prescription contained in the measure.

It is much the best plan to make it the practice to use a separate measure for all potent preparations, such as arsenical solutions, solution of strychnine, hydrocyanic acid, and the like, and, if the nature of the mixture permit it, measure such preparations last—that is, after the mixture is made up with water or other diluent, leaving room for the potent preparation.

The most useful measures for the dispensing-counter are 2-ounce conical, 4-drachm conical (graduated throughout for each 20 minims), and 20-minim pipettes (graduated for each minim). The conical measures should be selected of rather elongated shape, the inner sides forming a cone having straight sides (no bulging). Generally speaking, the 2-ounce measure should not be used for measuring quantities under 2 drachms, nor the 4-drachm measure for quantities under 20 minims.

How to Weigh.—The late Mr. Joseph Ince, in one of the dispensing aphorisms which have become familiar to many dispensers, said: ‘Hold the scales firmly by the left hand.’ Many wonder what that means; so we may explain that up to about fifty years ago the scales solely used in dispensing were apothecaries’ scales, kept in a box, and held up by the hand when weighing. They are still used in some pharmacies. The first illustration on page 30 is reproduced from Mr. E. W. Lucas’s ‘Pharmacy’ (published by Messrs. J. & A. Churchill), and shows how such weighing is done. These old-fashioned scales are now generally replaced by more accurate scales suspended from a pillar, or by delicate chemical balances.

In using dispensing scales and balances the weights are

put into the left-hand pan, the bottle, if desired, may be held in the left hand, and the powder be taken out with a spatula



held in the right hand in the manner shown in the subjoined sketch ; the forefinger being left free to tap the spatula, so that minute quantities may fall into the scale-pan when the



desired weight is almost obtained. Such substances as solid extracts are usually weighed on a tared piece of paper or on a tared watchglass.

Carelessness in Weighing or Measuring is not to be tolerated. There should be if possible—and there generally is in good pharmacies—a balance for weighing small quantities of alkaloids and other strong remedies. In no case should guesswork occur at the dispensing-counter. With mixtures or solutions generally there is little fear that such a course will be adopted ; but we have seen doses of powdered opium guessed at by the spatula, and so dispensed. We have seen more than once a definite weighed quantity of a compound powder subsequently divided without weighing into the prescribed number of powders. All good dispensers strongly condemn this or any other methods which court danger, and

pharmaceutical examiners show their appreciation of it by rejecting candidates who do such things. It is generally safe to give minims when *guttæ* are ordered, because drops vary in size according to the nature of the liquid, the lip of the bottle, the quantity in the bottle, temperature, &c.

In some cases it is desirable to weigh rather than measure a liquid—for example, in the case of a dozen minims of croton oil ordered for pills. Here it is practically impossible to get 12 minims of the oil out of a measure once it is in, but it may be weighed on the glass scale-pan upon some inert powder, such as soap, previously weighed. It should be remembered that a minim of anything lighter than water weighs less than one grain, or more than a grain if the liquid is heavier than water. The average specific gravity of croton oil is 0.950, and the weight of a minim of water is 0.9114 grain, so that $0.950 \times 0.9114 \times 12 = 10.42$ (say, $10\frac{1}{2}$ grains), the weight of 12 minims of croton oil. Similar calculations may be made in respect to other things.

Fractions of a Grain are frequently ordered—for example, twenty pills each containing $\frac{1}{24}$ grain of strychnine. In this case weigh 1 grain of alkaloid and triturate it with 11 grains of sugar of milk (which thoroughly divides it), and take 10 grains of the mixture for the twenty pills. A difficulty sometimes is found when fractions of minims are ordered—for example, two pills are ordered each to contain $m \frac{1}{8}$ of croton oil and $m \frac{1}{4}$ of peppermint oil. The best plan in this case is to rub up 1 grain of croton oil and 2 grains of peppermint oil with 10 grains of soap, and take a fourth part of the mixture for the pills.

Triturations of Potent Remedies.—For general dispensing-purposes triturations of arsenic, strychnine, sodium arsenate, mercuric chloride, &c., are very useful. Lightly triturate one part of the medicament with an equal weight of coarse sugar of milk until thoroughly mixed, then with firmer pressure until an impalpable powder is produced; next add gradually 8 parts of fine sugar of milk, and continue trituration until uniform, occasionally detaching all powder adhering

to the mortar and pestle. Transfer to a bottle, and label distinctly with the name of the medicament on one line, and below it 'Trituration 1 in 10.'

Percentage Solutions sooner or later become a problem to the dispenser or student, on account of differences of opinion about what they are and complications between our weights and measures.

The percentage solutions employed in chemical or other scientific research are solutions containing a known weight of the dissolved substance, called the 'solute,' in a definite weight of the solvent; thus a 5-per-cent. aqueous solution of borax is made by dissolving 5 grammes of borax in 95 grammes of water, or if glycerin is the solvent, 95 grammes of glycerin is taken. It follows that the volume strength of these scientific solutions varies according to the density of the solvent; thus the aqueous borax solution contains 5 of borax in about 100 by volume, and the glycerin solution 5 of borax in about 80 by volume. *These are not the solutions required at the dispensing-counter*—in fact, they are used in research, and only when all quantitative determinations are made by weighing so as to be independent of the volume changes induced by variations in temperature and atmospheric pressure. Medicinal percentage solutions are (in English-speaking countries) a definite weight or volume of the solute in a known volume of the finished solution. For example, a 1-in-1,000 solution of mercuric chloride would mean 1 gramme of the salt dissolved in sufficient solvent—say, water—to make 1 litre (1,000 c.c.), or 1 ounce dissolved in sufficient water to make 50 pints (1,000 oz.); but if we weigh the mercuric chloride in grains the operation becomes confusing because the minim is not the equivalent of a grain in the sense that the c.c. is the equivalent of the gramme and the oz. of the fl. oz. It is necessary to bear in mind that 1 grain in 100 minims is not a 1-per-cent. solution, but 1 in 91, and 1 grain in 110 minims is approximately 1 per cent.

In preparing percentage solutions at the dispensing-counter in quantities so small that the avoirdupois ounce is inadmis-

sible, the dispenser's easiest plan is to use metric weights and measures ; otherwise grains and measures in the proportions mentioned. Thus $4\frac{1}{2}$ grains of mercuric chloride in 10 ounces of water is a 1-in-1,000 solution—not strictly so, but sufficiently near for surgical purposes, although a pharmaceutical examiner might not pass it. The British Pharmacopœia 1-per-cent. solutions are made by dissolving 1 gramme of the solute in sufficient solvent to make 100 mls. of the solution (*i.e.*, $17\frac{1}{2}$ grains in 4 fluid ounces). Students are particularly cautioned to master the percentage problem. At examinations, as well as in every-day practice, prescriptions are occasionally seen which are apt to confuse. See the specimen examination prescriptions at the end of this book.

There is, however, an exception to the rule—namely, when the solutions are to be administered by minims. This is especially the case with hypodermic injections, which are generally given in minims, and physicians who order 1-in-10, 1-in-20, 1-in-100, &c., solutions of this kind reckon that they are to get the unit of weight in the specified number of minims. These give no trouble at the dispensing-counter, except when large quantities have to be made up ; then the following table will be useful :—

Gr.		Minims		Gr.		Fl. oz.
1	in	2	=	6,000	in	25
1	in	3	=	4,000	in	25
1	in	4	=	3,000	in	25
1	in	5	=	2,400	in	25
1	in	6	=	2,000	in	25
1	in	8	=	1,500	in	25
1	in	10	=	1,200	in	25

It is to be expected that the British Pharmacopœia, 1914, will make dispensers more familiar in practice with metric weights and measures, in which case strength of solutions will be grammes of solids (c.c. or mls. of liquids) in c.c. or mls. of the finished solution ; but care must always be exercised in regard to the prescriber's intention or the purpose of the solution—*i.e.*, whether the minim has to be considered or not. See p. 554 for a useful table of factors for solutions from 1 in 2 to 1 in 1,000.

PRESCRIBERS AND DISPENSERS.

IF more attention were given by prescribers to the possibilities of *ambiguous nomenclature*, it would be a great boon to pharmacists and would save much worry and occasional maltreatment. For preparations mentioned in the British Pharmacopœia the name there found should be used, and in ordering those not included in the B.P. the initials of the Pharmacopœia or the name of the standard work in which the formula may be found should be given.

No hard-and-fast rule can be laid down for the dispenser's guidance when he finds an article mentioned by a name which applies to two or more preparations. Probably the date of the prescription may help him. Suppose the following prescription is presented :—

Tinct. cinchonæ ʒij.
 Sig. : ʒj. ter die.
 June 6, 1884.

F. M. H.

The only official simple tincture existing when that prescription was written was *tinctura cinchonæ flavæ*. This tincture was expunged from the 1898 Pharmacopœia and a tincture of the red bark took its place, but there is no law which compels the dispenser to give the latter tincture in such an instance as the above. The patient has used the old tincture and may prefer it. The introduction of a new Pharmacopœia raises many questions of this kind in the case of preparations which have been altered. It is obligatory upon dispensing chemists to use the preparations of the British Pharmacopœia, 1914, after January 1, 1915, for prescriptions written after 1914, but not for prescriptions written before 1915. The following prescription is a good example of a case in which the substitution of an altered preparation for an old one gives quite a different result :—

Liq. bismuthi et ammon. cit.	℥xx.
Liq. magnesiæ bicarb.	ʒij.
Aquam	ad ʒss.

Pro dosi. Mitte ʒviij.

Jan. 10, 1885.

The liquor bismuthi of the 1867 B.P. gave a clear mixture, because it contained excess of ammonium citrate and nitrate which prevented precipitation of bismuth carbonate. The present liquor does not contain the excess, so the mixture made with it has a copious precipitate.

Sir W. Whitla says the dispenser will often be at a loss to understand the meaning of the prescriber when he orders some preparations out of their official names. Then he must either have a consultation with the prescriber or rely upon his experience. Sir William gives the following examples : When 'magnes. calc.' is ordered, magnesia B.P. should be used ; when 'magnes. carb.' the heavy preparation is usually intended ; when 'bismuth' or 'bismuth. alb.' is prescribed, the subnitrate is the preparation generally in the mind of the physician ; when 'aqua menth.' is ordered, 'aq. menth. pip. should not be used, but aq. menth. sativ. is the intention of the prescriber.'

This is a good example of the difference of opinion amongst authorities. In some establishments *aq. menthæ virid.* is always dispensed for 'aq. menthæ,' but this custom is not general. Aq. menth. virid. is ordered only by old practitioners, but aq. menth. pip. is decidedly the favourite, and is used officially as a flavouring agent. For these reasons it is advisable to use aq. menth. pip. when 'aq. menth.' is ordered, *unless the dispenser knows the intention of the prescriber to be the contrary.* In 1888 *The Chemist and Druggist* obtained the opinions of thirty leading London consultants on the question, 'What is aqua menthæ?' and only two or three said, 'Aq. menthæ vir.'

Sir William Whitla's remarks regarding magnesia recall a comment made in a previous edition. It was then said that some apparent difficulties can be settled by reference to the Pharmacopœia—e.g., *magnesia*, prescribed as such, means the mag. calc. pond. according to the B.P. The light variety is expressly designated *magnesia levis*. This no longer strictly

applies, for the term 'magnesia' has been changed to 'magnesia ponderosa,' and 'ponderosa' has also been added to magnesii carbonas. A conventional understanding exists among dispensers, when 'magnesia' and 'magnesii carbonas' are prescribed without their specific designation of 'levis' or 'ponderosa,' that the light should be used in mixtures and the heavy in powders. The light makes a smooth mixture and remains well in suspension; the heavy retains the minimum of bulk in powders—a distinct advantage when for children.

Certain alterations in nomenclature and potency of well-known articles and preparations are made by the British Pharmacopœia, 1914, which are specified on pages xxv and xxvi of the book. Dispensers should bear these in mind when compounding prescriptions dated anterior to January 1, 1915. The more important of these and other ambiguities are here noted:—

Acetum scillæ, B.P. 1914, is twice the strength of the 1898 preparation, but *syr. scillæ* is approximately as before.

Acid. nitro-hydrochlor., prescribed without the addition of the qualifying term 'dil.,' is an instance of careless prescribing, but it can hardly occasion a doubt, as the strong compound acid is not official.

Æther. chlor., formerly a source of some doubt, is now represented in the British Pharmacopœia by spirit of chloroform, the synonyms of which are *chloric ether* and *spirit of chloric ether*. It may here be pointed out that the original preparation made by Messrs. Duncan, Flockhart & Co. is distilled, is not of the same chloroform strength as the official spirit, and is soluble in water. Some prescribers still prefer it.

Aloes.—The question as to whether Barbados or Socotrine aloes should be used when 'aloes' only occurs in a prescription is one which formerly presented difficulty, but the British Pharmacopœia, 1914, allows either of these or Zanzibar aloes to be used, so that the prescriber must specify one of these if he has a preference, in which case the dispenser must use what is prescribed. It is desirable, otherwise, to give the aloes that has been used for any physician's prescriptions.

Emp. belladonnæ, B.P. 1914, is only half the strength of the 1898 plaster.

Emp. cantharidis, B.P. 1898, is no longer official, and has been replaced by a cantharidin plaster, of equal strength but totally different appearance.

Extracts, green.—The old preparations made from the fresh juices of, e.g., belladonna and henbane are replaced in the British Pharmacopœia, 1914, by alcoholic extracts made from the dried leaves.

Ferri cit. is sometimes written for ferri ammon. cit., but if a mineral acid be in the prescription the simple citrate of iron makes a better mixture.

Hydrarg. bisulph. may mean vermilion (*hydrargyri bisulphuretum*) or mercuric bisulphate. In ointments certainly the former.

Hyd. chlor. may mean calomel, corrosive sublimate, or chloral hydrate, and mistakes have happened in consequence of this wholly unnecessary abbreviation. But there is little excuse for a mistake if the dispenser thinks of what he is about. Corrosive sublimate is never given with a purgative or as a sleeping-draught, and the whole danger really lies in corrosive sublimate. But there may be almost equal danger when the medicine is for external use. For example, the dispenser who got the following prescription gave ammoniated mercury for 'hyd. chlor.' :—

Hyd. chlor.	.	.	.	.	.	.	.	gr. x.
Camphor.	.	.	.	.	.	.	.	gr. x.
Ung. cetacei.	.	.	.	.	.	.	.	ʒij.

It is reasonable to suppose that the prescriber means this to be a camphor-chloral ointment, but calomel and camphor (an excellent combination for piles and *pruritus ani*) were intended.

Inject. cocainæ hypoderm. and *inj. morph. hypoderm.* of the British Pharmacopœia were reduced in 1914 to half the strength of the 1898 injections.

Liq. cinchonæ.—Should Battley's preparation or the pharmacopœial liquid extract be supplied for this? The reply is that since the introduction of formulæ for liquid extracts into the Pharmacopœia 'liquor' and 'extract. liq.' are regarded as synonymous, and when liq. cinchonæ is prescribed without a maker being specified, the official preparation should be used.

Liq. ergotæ stands for extract. *ergotæ liquidum*. It may be that a prescriber means some special preparation, but if the fact is not known to the dispenser the official liquid extract is the proper thing to use.

Liq. morphinæ is very often written in prescriptions, and the dispenser will follow the majority in giving liquor *morphinæ hydrochlor.* There are exceptions, however, *e.g.* :—

Liq. plumb. subacet.,

„ *morphinæ* āā p. æ.

In this case use *liq. morph. acet.*, as with *liq. morph. hydrochlor.* there would be precipitation of lead chloride. Some physicians use only the acetate of morphine, but such prescribers are generally very particular in specifying what they want.

Liq. plumbi as an ingredient in a lotion is most probably the strong solution, but if *per se* the dilute liquor should be used.

Liq. strych. means *liq. strychninæ hydrochloridi*, B.P. 1914.

Liq. taraxaci.—The difficulty regarding the use of the word ‘liquor’ assumes a new phase when we turn to *liquor taraxaci*. ‘What should be dispensed for this, the *succus* or the liquid extract?’ If the prescription was written *before* the publication of the 1885 Pharmacopœia, the *succus* should be dispensed; but if *after*, the liquid extract.

Pil. phosphori, B.P. 1914, is only half the strength of the 1898 pill, and is made differently.

‘*Quinina*,’ strictly speaking, means the alkaloid, but in most cases the sulphate is meant.

Tinct. aconiti, B.P. 1914, is twice the strength of the 1898 tincture.

Tinct. belladonnæ, B.P. 1914, is a third weaker than the 1898 preparation.

Tinct. card. is occasionally prescribed, and the dispenser must use his discretion whether a simple tincture or the B.P. compound tincture is required. In such a case, if the prescription has been previously dispensed, it is best to explain the doubt to the customer, showing him that, though the appearance may differ, the medicinal importance of the

difference is but trifling. So also in such cases as *tinct. gentianæ*, *tinct. guaiaci*, &c. Generally speaking, it is correct to assume that the prescriber is quite familiar with the British Pharmacopœia, and the dispenser is at all events safe in assuming that he is, and using official medicines.

Tinct. colchici, B.P. 1914, is half the strength of the 1898 tincture, and *tinct. digitalis* is a fifth weaker.

Tinct. iodi, B.P. 1898, is *tinct. iodi mitis*, B.P. 1914.

Tinct. nucis vom., B.P. 1914, is half the strength of the 1898 preparation.

Tinct. opii was made a third stronger by the B.P. 1914, and contains 1 per cent. of morphine.

Tinct. strophanthi, B.P. 1914, is *four times the strength* of the 1898 tincture !

Ung. hydrarg. subchlor., B.P. 1914, is double the strength of the 1898 ointment.

Questions of Measurement.—The dispenser frequently meets with prescriptions in which it is doubtful what size of mixture the prescriber intends. The following is a good example :—

Ammonii bromidi	ʒiv.
Syr. chloral hydratis	ʒj.
Infusi gentianæ comp.	ʒvj.

M. fiat mistura. ʒj. horâ somni sumend.

Should this be dispensed as written, as a 6-ounce mixture, or as an 8-ounce ? If the dispenser cannot communicate with the prescriber, and has no means of knowing what his intentions in the matter are, the safe plan is to dispense the prescription as written. At the same time, this course would be considered pedantic by many pharmacists, because it is apparent that by making an 8-ounce mixture, a half-drachm dose of ammonium bromide and a drachm dose of syrup of chloral would be contained in each ounce ; and these are most likely intended. One pharmacist who held this opinion remarked : ‘ There are cases (and this is one of them) where the dispenser must use his own discretion, and be guided by experience, in trying to find out the intentions of the prescriber, and

to do this he must go beyond the bare written instructions. If he does this with tact and to the best of his ability, he will ensure the confidence of the practitioner and his patient, and avoid any need for explanation.'

It is also worth keeping in mind that one's care in following the letter of such a prescription is thrown to the wind if the patient gets his doses measured in a domestic spoon; and, after all, in a case of doubt 2 per cent. difference on a dose either way cannot disturb the therapeutic action of the remedy. No alteration should be made in a physician's prescription unless with the prescriber's sanction. Do not of course kill a patient for the sake of a rule.

Familiarity with the prescriptions of a physician obviates difficulties such as that under notice.

Alteration of Prescriptions.—The following are leading questions on this subject and prescriptions in illustration:—

To what extent is the dispenser justified in effecting the solution or suspension of an ingredient in a mixture which, though prescribed in an insoluble state, should be given in accurately divided doses?

To what extent do pharmacists consider it justifiable to manipulate a prescription in order to produce a good pharmaceutical preparation?

Bismuthi subnitratis . . . ʒij.
 Magnesiae ponderosae . . . ʒj.
 Tincturae gentianae comp. . . ʒj.
 Aquam ad ʒviiij.
 Fiat mistura.

Bismuth. carb. . . . ʒiij.
 Magnes. carb. . . . ʒiss.
 Tr. rhei co. . . . ʒj.
 Aquam ad ʒviiij.
 Fiat mistura.

The following opinions of leading pharmacists in different parts of the United Kingdom were elicited in 1905 (*C. & D.* lxvi. 865, 901, and 936):—

Messrs. Squire & Sons: 'It is not our practice to add mucilage to bismuth mixtures unless ordered in the prescription.'

Messrs. John Bell & Co.: 'We do not think it permissible to "manipulate" a prescription without previously consulting the prescriber, except where the patient could not get an exact dose or which would have dangerous effects.'

Mr. T. Maltby Clague: 'Many have a preference for bismuth mixtures without suspending agents. To add these is an indiscreet liberty quite different from the departure which must sometimes be made to avoid a chemical change or an impracticable admixture.'

Messrs. Clay & Abraham : 'There would be no occasion to add mucilage to bismuth-carbonate mixture unless in exceptional circumstances. The addition is in many cases a distinct disadvantage. Many medicines are prescribed which it is impossible to dispense as written.'

Messrs. Jolly & Co. : 'A general rule with us is not to add anything to a mixture unless absolutely necessary—in which case a note is made on the prescription showing the quantity and composition of the agent employed.'

Mr. Harold E. Matthews : 'A pharmacist should never alter the medicaments in a prescription nor the quantities on his own responsibility. He should exercise his discretion as to addition or omission or excipients.'

Mr. Stewart Hardwick : 'Any deviation considered necessary should not be made recklessly, but with the governing idea in mind—viz., "the intention of the prescriber."'

Mr. Peter Boa : 'The principle which guides a pharmacist is to make no addition if the prescription can be dispensed as it stands, and if any addition is to be made it must be of the most innocent description, and only with the object of securing equality of dosage or preventing serious deterioration of the active principle.'

Dr. J. F. Tocher : 'The addition of mucilage or of any substance changing the character of the dispensed article is quite unwarrantable, without the consent of the medical practitioner.'

Mr. E. Saville Peck : 'The one aim of the pharmacist should be the faithful interpretation and subsequent carrying out of the actual intentions of the prescriber in so far as they can be ascertained from a prescription. . . . He is not justified in "manipulating" a prescription in order merely to produce a good pharmaceutical preparation.'

Mr. W. F. Wells : 'If there is an apparent error in a prescription, it is the dispenser's duty to communicate with the prescriber. In the case of the bismuth mixture, the chemist had no right to add mucilage, as it is not necessary, and many prescribers prefer the mixture without.'

Mr. Harold Wyatt : 'The standpoint I take with regard to alterations is—(1) Never add to a formula anything of an active nature ; (2) always note additions on the prescription ; (3) never make an alteration or addition out of mere routine ; (4) always have a good and logical reason to give the doctor for such additions.'

Another case may be cited. Is the substitution of liq. arsenici hydrochlor. justifiable in the following prescription?—

Liq. arsenicalis (Fowler's)	.	.	.	.	.	3j.
Liq. hydrarg. perchlor.	.	.	.	.	.	3j.
Aquam	.	.	.	.	.	ad 3iv.

M. ft. mist. 3ij. t.d.s.

The potassium carbonate in the liquor arsenicalis precipitates the mercury, and there is a possibility of the patient getting the whole of it (as mercuric hydroxide) in the last dose.

An analogous result is shown in mixtures of liq. arsenicalis and liq. strychninæ in certain proportions, the alkaloid being in this instance precipitated. In both these cases the acid solution should, preferably, be used.

A prescriber gave a patient the following prescription, which was dispensed with liquor arsenicalis, and in due course the patient died, the symptoms being those of strychnine poisoning (the alkaloid separated in crystals):—

Liq. as.	.	.	.	.	.	.	.	℥j.
Liq. strych.	.	.	.	.	.	.	.	℥v.
Aq.	.	.	.	.	.	.	ad	℥vj.

M.

Such prescriptions are very dangerous, as they often 'go all right' in dispensing, being quite clear when sent out, because the precipitation of the alkaloid is delayed. The following are the solubilities of the specified alkaloids in water at 15° to 20° C. :—

Aconitine (cryst.)	.	.	.	.	.	.	.	1 in 2,500	Hyoscine	.	.	.	.	.	.	.	.	about 1 in 1,000
Apomorphine	.	.	.	.	.	.	.	about 1 ,, 800	Morphine	.	.	.	.	.	.	.	.	1 ,, 1,000
Atropine	.	.	.	.	.	.	.	1 ,, 500	Physostigmine	.	.	.	.	.	.	.	.	1 ,, 350
Cocaine	.	.	.	.	.	.	.	1 ,, 1,300	Pilocarpine	.	.	.	.	.	.	.	.	less than 1 ,, 1,000
Codeine	.	.	.	.	.	.	.	1 ,, 80	Strychnine	.	.	.	.	.	.	.	.	1 ,, 7,000
Conine	.	.	.	.	.	.	.	1 ,, 100	Veratrine	.	.	.	.	.	.	.	.	insoluble
Homatropine	.	.	.	.	.	.	.	about 1 ,, 1,000										

The solubilities are greater in aqueous alkaline solution—*e.g.*, of strychnine 1 in 3,000 of 10-per-cent. ammonia solution—but ammoniated alcohol is a poorer solvent of alkaloids than alcohol itself. From the above data dispensers will be able to judge whether or not precipitation is likely to take place in simple mixtures of alkaloidal salt solutions and alkalies (*C. & D.* 1912, II. 475). See also page 291.

Careless Prescribers.—It would save the pharmacist a great deal of anxiety if prescribers would take the trouble to initial unusual doses, for many instances occur where it is impossible for the dispenser to know whether the dose is safe or

not ; for example, the official dose of potassium iodide is 5 to 20 grains, yet 30 grains is a frequent dose, and even 1 or 2 drachms twice or three times a day, but some patients experience very unpleasant effects from a single dose of 2 grains. Again, the official dose of ext. ergotæ liq. is 10 to 30 minims, although 1 drachm is a very common dose, and in some cases 4 drachms or 1 ounce may be given with impunity.

Another example :—

Pil. coloc. co.	.	.	.	.	.	.	gr. ij.
Pil. cambogiæ co.	.	.	.	.	.	.	gr. j.
Strychninæ	.	.	.	.	.	.	gr. $\frac{1}{24}$
Ext. bellad.	.	.	.	.	.	.	gr. ij.

Ft. pil. in arg. Mitte xxiv. Sig. : One at bedtime.

Two grains of ext. bellad. (green extract, B.P. 1898, was intended) for a dose is unusual, but as the pill was for an adult, and was given only once a day, it might have been dispensed. But the dispenser happened to know that the prescriber gave only *small* doses of belladonna ; the prescriber was therefore consulted, and the dose altered to $\frac{1}{4}$ grain.

Where unusual doses are prescribed, the quantity should be indicated in words as well as figures. Thus :—

Tr. opii ℥ L. (50 minims) h.s.s.

would save the dispenser from any hesitation as to whether the quantity was L. or 4. A case was reported early in 1904 in which '℥vi.' was so written that the dispenser read it for '℥ 61,' and, not knowing that the medicine was for a baby, dispensed the larger quantity of morphine solution, and the child died.

Cipher Prescriptions are, happily, not common, and are usually a convenience to the prescriber rather than an attempted concealment of his intentions in favour of a particular pharmacist. They are annoying, nevertheless, to those who have to tell customers that they cannot dispense the prescriptions without consulting the prescriber or the pharmacist who first dispensed the prescription. The best course to adopt with customers when such prescriptions are received is to say that this is a special preparation of Dr. So-and-so's,

about which you will need to write to him. Then write to the prescriber, enclosing a stamped and addressed envelope for a reply.

Extra Doses.—The preface to the British Pharmacopœia, 1914, contains the following statement, which, though not legally binding upon pharmacists, represents customary practice :—

The medical practitioner will exercise his own judgment and act on his own responsibility in respect of the amount of any therapeutic agent he may prescribe or administer. Where, however, an unusually large dose appears to be prescribed, it is the duty of the pharmacist or dispenser to satisfy himself that the prescriber's intention has been correctly interpreted.

In the German Pharmacopœia a table of maximum doses of certain powerful medicines is given, and if the prescriber desire to exceed the amount there set down he is required to mark the quantity. If this is not done the dispenser is held responsible for the consequences if he dispense the dangerous dose. Two curious cases were mentioned by Dr. Hager. In one, an extra dose of cyanide of potassium had been ordered, and the prescriber had several times *underlined* the quantity. The patient died, and the dispenser was condemned to a year's imprisonment because he had dispensed the medicine without the proper mark (!) being attached. In the other case, the physician meant to order 4 grammes of chloral hydrate, and he should have written grm. 4·0. He omitted the decimal point, however, and the dispenser gave 40 grammes. At that time chloral hydrate was not included in the German Pharmacopœia, and therefore was not in the table of dangerous substances. But the dispenser was sentenced to a long term of imprisonment.

It is indeed a constantly recurring difficulty to dispensers of limited experience to know whether certain quantities prescribed are not either unusual or dangerous doses. The British Pharmacopœia doses 'are not authoritatively enjoined as binding upon prescribers . . . and represent . . . the average range of the quantities which, in ordinary cases, are usually prescribed for adults.' Provincial dispensers may generally feel safe when the autograph prescription bears the business-

stamp of some London house. It has probably been dispensed many times ; and the pharmacist is advised not to indicate by his manner, still less by any direct question to the patient, that there appears to him to be anything remarkable in the prescription which he is called upon to dispense.

But do not follow the example of the London house if you think that there is a possibility of poisoning the patient. For instance, a prescription was given in to a provincial house which ordered a large dose (about an ounce) of *aq. laurocerasi*. It bore the stamp of a leading London house, and appeared therefore to have been taken by the patient with safety. Not being satisfied, the provincial chemist inquired about the matter, and found that the London house had omitted a considerable quantity of the *aq. laurocerasi*. This incident emphasises the aphorism : If a prescription be altered it should be so marked.

Many examples of large doses could be cited. Two grains of *extract. cannabis indicæ* has been given every two hours in a case of tetanus, but the case was watched by several medical men. Teaspoonful doses or more of *bismuth subnitrate* are common, either as a cure or to coat the stomach for *x-ray* purposes. In some cases ordinary doses of narcotics cause great excitement. For example, 30 grains of *chloral hydrate* has made a man most obstreperous, but *drachm* doses induced sleep. A well-known authority states that he has seen 5 ounces of the juice of *conium* ordered and taken daily, $\frac{1}{2}$ grain of pure *hyoscyamine* for a dose, and 1 *drachm* of tincture of Indian hemp three times a day. The patients who took these doses were, of course, under special observation.

The following prescription was given to be dispensed as a draught :—

Potass. iodid.	3iss.
Tinct. aurantii	3ij.
Tinct. cinchonæ	3ss. M.

No directions were given. On the pharmacist expostulating with the customer as to the largeness of the dose of iodide, it was most strenuously affirmed that it was for one dose only. It had been dispensed before for a friend, who lent it to the

customer. Probably there was here a little attempt at economy, the customer intending to add the necessary water.

At the Minor examination on one occasion, a candidate got the following prescription to dispense :—

Ol. ricini	.	.	.	.	.	.	.	ʒij.
Pulv. acaciæ	.	.	.	.	.	.	.	ʒj.
Pulv. opii	.	.	.	.	.	.	.	gr. v.
Aq. menthæ pip.	.	.	.	.	.	.	.	ʒj.

Fiat haustus. Statim sumendus.

The candidate told the examiner before compounding the draught that it should not be dispensed, because it contained too much opium. He was told to dispense it as written, and did so. Before he left the dispensing-counter, the examiner asked the candidate what he had to say about the prescription, and the candidate repeated his objection to the large dose of opium, which he considered to be a probably fatal dose. 'Quite right,' said the examiner; 'and what would you do in the circumstances?' 'Consult the prescriber,' was the reply, which satisfied the examiner, and the candidate passed.

The foregoing fairly indicates how the dispenser should act when exceptionally large doses confront him. Nothing about the matter should be said to the customer, but delay should be secured if possible in order that the prescriber may be consulted. This is the more difficult part of the matter, because some medical men strongly resent any interference, as they consider it, by the pharmacist; the fact being that in most of such instances they feel hurt that their blunders have been detected. The pharmacist should have little difficulty in knowing what to do with such men's prescriptions, for if the prescriber places his assumed dignity before the comfort and, maybe, life of his patient, the pharmacist may reasonably act upon his own responsibility, taking the British Pharmacopœia as his guide in respect to doses. See the note on 'Errors in the Prescription.'

General Directions are as a rule unsatisfactory and often lead to mistakes. We have been asked, If a doctor sends a

prescription for a mixture (not dangerous) marked 'Special : *To be taken as directed,*' is he justified in condemning the dispenser as an unpardonable offender for sending the mixture to the patient without further instructions respecting dose? The censure is unwarranted. 'To be taken as directed' implies that the prescriber has given directions, but it is not uncommon to find that the prescriber has omitted to do this, and for that reason it is always safe for the dispenser to ask the customer how the medicine is to be used, and so ascertain whether the directions are sufficient or not. If the mixture is dangerous and the directions have been omitted, a polite note may be sent to the doctor, or the customer may be asked to call upon him for instructions.

Errors in the Prescription.—If possible, reference should be made to the writer. Caution must be used in concluding that a *fancied* error or omission is *real*. 'Common-sense' is frequently appealed to, but this indefinable judge cannot be called into operation unless the 'sense of the community' on the point in question has been obtained. Too many people confound their own individual opinion with the dictates of 'common-sense.' For instance, some dispensers invariably add acid to a mixture containing quinine, although solution of the alkaloid is not prescribed. Now, many physicians prefer administering quinine in suspension, and it is decidedly less disagreeable taken in this manner, especially when large doses are exhibited. Moreover, when quinine is given to a woman nursing it is usual on the part of the prescriber to avoid an acid, as it checks the secretion of milk.

Wishes of Patients.—Sir William Whitla says, 'Where a prescription is repeatedly compounded the patient often asks for the dose to be increased, or some other change to be made. The dispenser should not accede to such a request, no matter how simple it may appear, without a consultation with the prescriber; nor is it advisable for him to inform the patient (even when pressed) of the ingredients in any prescription. He can refer them to the physician, or do as the writer has done long ago, when it was impossible to avoid such a

revelation—read it in full Latin to the patient.’ This ruling is somewhat stringent. One occasionally meets with customers—they are generally regular customers—who may safely get a hint as to what a medicine is composed of.

Repeating Prescriptions.—There is no rule against repeating a prescription as often as may be desired by the patient, but a conscientious dispenser will see that he does not acquire a pernicious habit. The majority of prescriptions may be repeated without warning or comment; but there are some, such as those containing arsenic, digitalis, strychnine, &c., which, from their cumulative tendency, may produce serious consequences if repeated too frequently; and in such cases it is, we believe, not more to the interest of the patient than of the dispenser that the suggestion be made to consult again the physician as to their continuance. There are other prescriptions, such as those containing chloral hydrate, morphine, and cocaine, the repetition of which is apt to engender the worst of vices on the part of the patient. A little reflection will show the responsibility incurred where repetition may lead to the formation of a bad habit. In regard to the repetition of medicines containing poisons, see the comments on page 5.

Proprietary Preparations.—There is no rule regarding the dispensing of proprietary preparations, and the dispenser must act according to circumstances in each case, endeavouring whenever possible to dispense the medicine as if it were compounded by himself. Preparations which are subject to medicine stamp-duty are exempt from that duty when they form part of the ingredients of a medicine dispensed—that is, are mixed with something else :—

Syr. hypophos. co. (Fellows)	.	.	.	.	ʒij.
Aquæ	.	.	.	.	ʒij.

M. Sig. : ʒj. t.d.s.

This should be dispensed in the chemist’s own bottle with his own label, and does not require a medicine-stamp; but a prescription such as—

Syr. hypophos. co. (Fellows)	ʒiv.
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Sig. : ʒj. t.d.s.

—cannot be dispensed in Great Britain without a medicine-stamp in proportion to the charge made ($1\frac{1}{2}d.$ for $1s.$ and under, $3d.$ for $2s.$ $6d.$, and $6d.$ for $4s.$). The fact that the medicine may have already paid duty does not alter the case, as the Board of Customs and Excise do not permit a stamped medicine to be rebottled, reboxed, &c., without fresh stamps being applied. This rule also prevents such medicines as lactopeptine being dispensed in powders or cachets without the appropriate medicine-stamps. Whether the rule is strictly followed in practice or not is another matter; indeed, it is open to question whether the Board of Customs and Excise could or would insist on duty being paid on a medicine *which has already paid duty*, and which forms part of a prescription dispensed without revelation of the name to the purchaser. Such a sale can scarcely be regarded as a sale of a proprietary medicine.

Another aspect of the matter is, How should proprietary medicines be dispensed—in the original package or in a fresh package? This depends, in part, upon the prescription. Some prescribers are in the habit of writing such orders as—

Syr. hypophos. co. (Fellows) 1 bot.

Sig. : A teaspoonful in a glass of water at 12 o'clock and 4 o'clock.

The dispenser has no option in this case but to remove the wrapper and place his own label upon the bottle, but if the prescription at all permits, this practice should be avoided: it is not good pharmacy to dispense medicines otherwise than in the dispenser's own containers. In this case, as Fellows's syrup contains strychnine, the entry in the prescription-book, 'Fellows's syrup, 1 bottle,' and the name of the person to whom it is delivered, is all that is legally required of the dispenser. It should be noted that the Government stamp (if already affixed) must not be removed or torn in the act of dispensing dutiable medicines. The dispenser can only get over this by using a bottle supplied for dispensing-purposes.

SPECIAL DRUGS AND DISPENSING CONVENIENCES.

WATERS.

Aqua.—It is customary for distilled water alone to be used for 'aqua' by the best dispensing chemists, but in Great Britain Insurance Act dispensing has resulted in a rule being formulated to the effect that dispensers shall use tap-water for 'aqua.' Distilled water is distinguished from natural water by containing no solids, and it should be free from ammonia and other impurities. Supplies of distilled water are generally obtained from wholesale houses, but it should never be stocked without examination, in case it be (as has happened) the condensed vapour from steam-heating pipes or steam boilers, consequently liable to contain impurities, of which ammonia and nitrites are the most common, the latter giving very strange results in mixtures containing iodides. Moreover, such distilled water has a tendency to become viscous, owing to the formation of thread-like organisms. The best plan is to distil water as it is required, adding to every 5 gallons of water in the still 10 grains of potassium permanganate (or a drachm of potassium bichromate) and a drachm of sulphuric acid. This ensures the destruction of organic matter, the products of which remain in the still. For uniformity and elegance in dispensing distilled water is necessary.

Aqua Fontana.—The variation of calcareous matter in different natural waters is alone a sufficient reason for excluding them from the dispensing-counter, because some mixtures compounded with such water differ in ap-

pearance according to the amount of calcareous matter contained in the water. The following are examples of what may be expected when distilled water and tap-water are used indifferently.

Tinct. lavand. co. gives a bright mixture with distilled, but a muddy one with tap, water. Tinct. cardamom. co. produces with distilled water a reddish-brown colour, but with tap-water a brilliant crimson, as if ammonia had been added.

Liq. arsenicalis gives a precipitate of calcium carbonate with tap-water, which will probably be regarded by any nervous patient who knows what is in the mixture as the arsenic imperfectly dissolved, if it has been previously obtained without such a deposit owing to the use of distilled water.

Liquor hydrargyri perchloridi gave a lot of trouble until the 1898 Pharmacopœia removed the ammonium chloride from it. The older solution contained a double salt which reacted with earthy carbonates, giving a precipitate of mercuric oxide, so that when diluted with tap-water the old solution deposited. The late Mr. W. Martindale showed that this does not happen with solution of mercuric chloride alone, and his suggestion was adopted by the B.P. authorities.

Such prescriptions as the following are occasionally seen at the dispensing-counter :—

I.				III.			
Argent. nit.	.	.	gr. v.	Plumbi acet.	.	.	gr. xij.
Aquæ	.	.	℥j.	Sp. vin. rect.	.	.	℥j.
M.				Aquam	.	.	ad ℥iv.
				M.			
II.				IV.			
Syr. ferri iod.	.	.	℥j.	Ammon. carb.	.	.	℥ss.
Aquam	.	.	ad ℥iv.	Spir. chlorof.	.	.	℥j.
M.				Inf. gent. co.	.	.	℥vj.
				M.			

It is sometimes advisable to boil distilled water, so as to get rid of carbonic acid, which it may contain, and which causes precipitates in Nos. I. and II. In dispensing No. III.

the rectified spirit should be mixed with the water before the acetate of lead is dissolved in it. The spirit furthers the expulsion of the air and carbonic-acid gas, and so prevents precipitation of lead as carbonate.

If the infusion of gentian in No. IV. be made with tap-water, the result will be that the calcium bicarbonate present in tap-water, which is only deposited on prolonged boiling, reacts with the ammonium carbonate with precipitation of calcium carbonate, which makes the mixture slightly turbid.

Extemporaneous Aromatic Waters.—Distilled aromatic waters have a finer flavour than those prepared by the mixture method, and in some cases, notably rose-water, the odour of the extemporaneous preparation is quite different from the distilled. Various substances of an alkaline-earthly nature are added to the oils in the mixture method in order to render them soluble, and, as has been shown by Shuttleworth, these substances generally keep back a portion of the oil, so that the water takes up no more, or little more, than it would do if the earthy powder were not added. It should also be remembered that the powder dissolves to some extent, and therefore affects mixtures containing alkaloids and other substances precipitable by alkalies. Cases are actually recorded in which strychnine has been precipitated in a mixture with peppermint-water made by the magnesium-carbonate method. Such mishaps may be obviated by the use of B.P. waters or substitutes made by either of the following processes.

The amount of oil used in most cases is 1 part to 500 of water (say, a drop to the ounce), which is sufficient to saturate water. The simplest plan is to put 2 drachms of the essential oil into a gallon earthenware jar, and pour upon it 120 ounces of boiling distilled water. Allow to stand for a few minutes, then cork and shake well, repeating the shaking occasionally until the water is cold. Then set aside for twelve hours and draw off the clear water. This has an excellent aroma. A second method is : Prepare a solution of 6 drachms of essential oil in 4 ounces of rectified spirit (90-per-cent.), and

of this add 1 ounce to 4 pints of water. Shake well, and allow to stand until clear, then syphon off the clear water.

The earthy powders which are most used for rendering essential oils soluble are light carbonate of magnesium, powdered pumice-stone, kaolin, silica, phosphate of calcium, and talc (French chalk). The method to be followed for a pint of any water is to dissolve from 20 to 40 minims of the oil in four times as much spirit, add an ounce of water, and triturate with $\frac{1}{2}$ ounce of any of the powders (2 drachms of magnes. carb. levis is enough), then add the rest of the water, transfer to the bottle, shake occasionally for an hour, and filter. The most objectionable powder is magnesia, and the least objectionable is finely pulverised white talc, washed with hot water slightly acidulated with hydrochloric acid, then with hot water only to remove acid, and dried for use. Talc powder may be used by adding $\frac{1}{2}$ ounce of it to the cloudy mixture (such as is formed by shaking up 3ss. of ol. anethi and 3ij. of S.V.R. in a quart of water) and filtering through paper, or a *talc filter* may be prepared in the following manner: Make a double filter out of white filtering-paper and insert it in a glass funnel; mix about $\frac{1}{2}$ ounce of talc with 1 pint of hot water in a bottle, shake well and pour upon the filter, taking care so to distribute the mixture that the entire filter from bottom to top is evenly covered with the fine powder; the water will rapidly pass off perfectly clear, after which the filter is ready for filtering any cloudy mixture. The same filter may be used frequently for the same water.

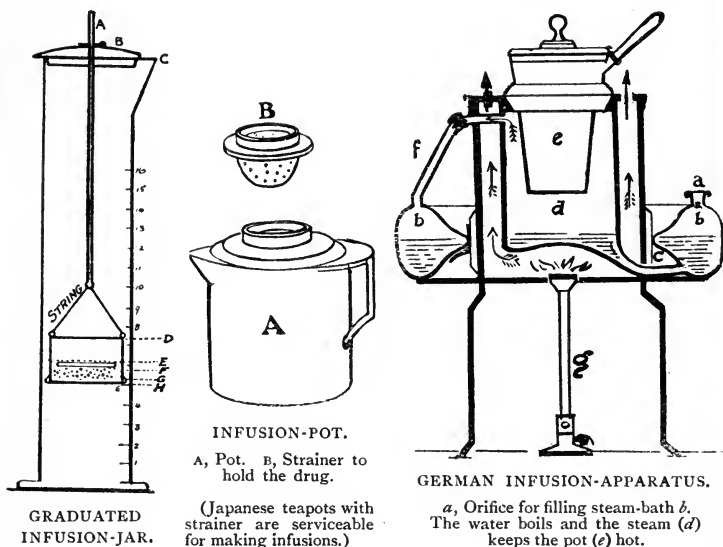
It is generally objected that alcohol should not be employed in making aromatic waters, because, in the small proportion employed, it is exceedingly liable to become changed into acetic acid. Concentrated waters are weak alcoholic solutions of the essential oils, about ten times stronger than the waters, yet '1 to 40.'

CONCENTRATED INFUSIONS.

In most of the large pharmacies the duty of preparing infusions for use during the day falls to the assistant who has

been on night-duty. The question whether the dispenser is justified in using concentrated infusions or not has been answered with much circumspection by an experienced pharmacist, who said, 'Never use concentrated infusions when time allows of fresh ones being made. The aroma of the recent infusion is often wanting, whilst the difference in appearance is in most cases very marked.'

The British Pharmacopœia, in order to meet the objection of loss of time, which is frequently urged against fresh infusions,



reduced the period of infusion so that any medicine containing one can now be dispensed in half an hour.

When 8 ounces of any infusion is required, 10 ounces at least should be made, as the marc absorbs a good deal of the menstruum, and the Pharmacopœia does not direct it to be pressed out.

In some parts of the country it is quite the exception to

use anything except concentrated infusions in dispensing, and this fact is recognised by the prescribers. The B.P. has so far bowed to the demands of the times as to provide formulæ for *concentrated liquors* which, on dilution with water, yield liquids resembling infusions; but it is specially provided that these should not be used when infusions are ordered.

Infusion of Digitalis is one of the most active preparations of this valuable drug. It should always be freshly prepared, and dispensers should not use concentrated preparations as the equivalent of the fresh infusion. In 1888 Professor Kobert, an authority on the characters of glucosides, showed that in weak alcoholic menstrua the active principles of digitalis undergo such change as to render them almost valueless as heart-stimulants. Apart from this, infusion of digitalis is frequently prescribed because the physician does not wish alcohol in the medicine.

Infusion of Gentian (Compound).—There is no concentrated liquor in the B.P. to represent this, although it is the most frequently used infusion. The fact is, it is difficult to prepare a satisfactory concentrated preparation which is not more of the character of a tincture than of an infusion.

Infusion of Senega.—A little ammonia is generally added to the concentrated preparation, to prevent precipitation of senegin or its decomposition-products.

Infusion of Serpentry should, preferably, be made from the whole rhizome, because if bruised the starch granules are freed, and thus some of the starch gets into solution, and the infusion strikes a blue colour with iodine. It is sometimes advised to make the infusion with the old rhizome because, unlike the young rhizome, it contains no starch; but the dispenser will seek in vain for commercial varieties known as 'young rhizome' and 'old rhizome.'

SOLUTIONS.

It is usual for dispensers to keep solutions of salts often required in prescriptions. These are not only convenient, but frequently impart to a mixture a bright appearance which otherwise would be wanting. No one would recognise a mixture made with *infus. rosæ acid.* and a solution of Epsom salt as the same preparation as one made by dissolving the salt in the infusion of roses. The same is true, in greater or less degree, of very many other previously made solutions; to a large extent this accounts for the physical differences observed in mixtures dispensed at different establishments.

The following are the solutions which are in most common use. It should be noted that solids for any quantity in ounces should be taken by apothecaries' weight—that is, 480 grains; for example, *sol. ammon. brom. 1 in 4* means 480 grains ammon. brom. in 4 fluid ounces of the solution. The solutions should be made from the unpowdered substances:—

Sol. <i>Acidi tannici</i>	. . . . .	1 in 2 (S.V.R.)
„ <i>Aluminis</i>	. . . . .	1 in 16
„ <i>Ammonii bromidi</i>	. . . . .	1 in 4
„ <i>Ferri tartarat.</i>	. . . . .	1 in 4
„ <i>Ferri et quiniæ citrat.</i>	. . . . .	1 in 2
„ <i>Magnesii sulphatis</i>	. . . . .	1 in 2
„ <i>Plumbi acetatis</i>	. . . . .	1 in 16
„ <i>Potassii acetatis</i>	. . . . .	1 in 2
„ „ <i>bicarbonatis</i>	. . . . .	1 in 4
„ „ <i>bromidi</i>	. . . . .	1 in 4
„ „ <i>chloratis</i>	. . . . .	1 in 24
„ „ <i>iodidi</i>	. . . . .	1 in 2
„ „ <i>nitratis</i>	. . . . .	1 in 8
„ <i>Sodii bicarbonatis</i>	. . . . .	1 in 16
„ <i>Zinci chloridi</i>	. . . . .	1 in 4
„ „ <i>sulphatis</i>	. . . . .	1 in 8

Solutions containing 10 grains of the solid in each fluid drachm are on the whole most convenient, provided they keep, for in many instances concentrated solutions keep much better than weaker solutions. Quinine and iron citrate is a notable example, a solution of 1 part in 2 keeping for

weeks, while a weaker solution quickly becomes bad. It is advisable to keep *glycerin* dissolved in its own volume of distilled water, which ensures more accurate measurement.

The solutions of alkali bicarbonates are liable to change, with formation of carbonate and consequent introduction of all sorts of unexpected reactions, not to mention the distinctly greater alkalinity of the carbonate. It is better not to keep the bicarbonates in solution. It is a good plan to keep all these dispensing-solutions in a dark cupboard: many of them are affected by light. In weak solution chloral hydrate soon decomposes and becomes acid, acquiring an odour not unlike a mixture of tolu and benzene. We prefer not to keep this chemical in solution, but in powder form, so that it dissolves readily. A 1-in-1 solution may, however, be kept. It is made by dissolving 100 grains of chloral hydrate in sufficient water to make the solution measure 100 minims. In cold weather sodium-salicylate solution (1 in 1) occasionally crystallises, a hydrated ($6\text{H}_2\text{O}$) salt separating.

Normal saline solution, prescribed for intravenous injection, washing wounds, &c., is a solution of 11 grains of sodium chloride in 4 ounces of sterilised distilled water.

Solutions should be made either by stirring the solid with the solvent in a measure, or by shaking the two together in a bottle. It is a mistake to use a glass mortar, or any mortar. Very frequently glass mortars are disrupted with explosive force when solids are rubbed or dissolved in them. This is especially the case with hypophosphites. Wedgwood mortars should not be used for making solutions until they have been carefully washed out in hot water and a little alkali (liquor potassæ). The most useful mortar for solutions is one of the high-glazed porcelain sort.

Solution, it may be noted, is, so far as dispensing is concerned, the mixture of a *solute* (gas, liquid, or solid) with a *solvent* so as to form a clear product termed a *solution*. The quantity of a solute which dissolves in a solvent is constant for each substance under particular conditions. The solubilities of chemicals in water are usually determined at 15.5°C . (60°F .),

and represent the weight of the substance dissolved by a weight of water. In this case the *weight* and *volume* of the solvent are synonymous, but in the cases of alcohol, glycerin, and other solvents whose densities are less or more than unity, text-book figures as to solubility may be doubtful, because continental workers and many in this country invariably mean the solvent by weight. Figures employed in this book represent liquids by volume. Some knowledge of the phenomena and principles of solution is of great value to dispensers, who may frequently by the application of that knowledge avoid or overcome difficulties otherwise unexplainable.

The more important theory of solution is the hydrate theory, in which it is assumed that in the course of solution of substances in water the substances undergo hydration, and, in fact, chemically combine with the water. This is well exemplified in solutions of alcohol in water, of caustic potash in water, and of sulphuric acid in water, much heat being evolved during solution. This proof of chemical action has had corroboration in the isolation of hydrates of the dissolved substances ; thus the alcohol in proof spirit does not exist as C_2H_6O , but as $C_2H_6O.xH_2O$, and so also with sulphuric acid and caustic potash, each of which in aqueous solution is chemically associated with several molecules of water.

Whatever the theory of solution may be, there is at least agreement amongst the theorists in regard to the promotion of solution by certain forces. Fine division of the solute has a great influence in promoting solution ; powdered chemicals are more easily dissolved than the crystals, and although, as already mentioned, some powdered chemicals do not yield clear aqueous solutions, that is because the chemicals have been soiled, as it were, by the mills in the course of grinding. The preparation of aromatic waters, upon which we have just touched, affords an admirable example of the advantages of fine division in promoting solution. If we rub up an essential oil with talc or calcium phosphate, we simply coat the particles of the solid with a film of the essential oil, so that when water

is added a very large surface of the oil is offered to the water and solution is rapid. So also if the oil is dissolved in rectified spirit and poured into the water ; here the oil separates in minute globules, hence is more quickly taken into solution. It is obvious, however, that the powder method ensures the larger surface, hence quicker and better solution.

Agitation is another important solution-promoting factor, but all that agitation does is to bring the solute into contact with fresh portions of solvent. It stands to reason that if a salt lies at the bottom of the solvent it will take a long time before it is dissolved. One might keep an ounce of potassium chlorate at the bottom of 24 ounces of water for many days without complete solution being effected, because a layer of the water next to the salt would become saturated, therefore more dense than the solvent above, and we should have to rely entirely upon the slow process of diffusion to bring fresh molecules of water into contact with the undissolved chlorate. From this the value of agitation added to fine division may be judged. Any method which brings fresh solvent into contact with the undissolved substance answers the purpose, as, for example, in percolation ; or suspending the solute or solid in the solvent—which is the course adopted in making infusions, whereby the solution as it is formed sinks to the bottom of the vessel, and thus starts convection-currents in the whole fluid which amount practically to automatic agitation.

Heat is one of the most potent factors in promoting solution, and one of the most dangerous for dispensers to use, because, with very few exceptions, substances are more soluble in hot liquids than in cold, so that when hot solutions cool they deposit the excess of solute which they contain. Hence if the dispenser wishes to expedite matters by using hot water, he should assure himself by reference to the Pharmacopœia solubilities that the amount of substance taken will remain in solution at 60° F.

Many examples of solution-phenomena are described throughout this work. It will be especially noted that the relations of alcohol to water in the solution of substances

require all the dispenser's intelligence, especially with the view to ensuring that the patient gets the full dose of the active ingredient of an alcoholic medicine which has to be taken in water. The most familiar example of this group is tinct. quininæ ammon., which is virtually a solution of quinine hydrate in alcohol. Quinine hydrate, like all other alkaloidal hydrates, is but feebly soluble in water, consequently on diluting this tincture with water the alkaloid is precipitated ; but if the dose be added to the water, the precipitate is in finer division and remains sufficiently long in suspension to admit of the dose being swallowed, which is not the case when the water is added to the tincture. The same order holds good with resinous tinctures or fluid extracts. It may also be observed that some solvents change the chemical characters of the solutes. This is virtually the case in tinct. quininæ ammon., and when we add a dilute acid to quinine sulphate in mixture we promote solution of the salt by changing it into the much more soluble acid sulphate. Some changes in solution are apt to be overlooked ; for example, stock solution of butyl-chloral hydrate made with glycerin and rectified spirit is very convenient, as when first made it mixes quite clear with water ; but ere long on adding the solution to water, there is a precipitate of oily drops which are most intractable. These drops are really butyl-chloral alcoholate, formed by the alcohol molecule displacing the water molecule in the hydrate ; and the alcoholate is much less soluble in water than the hydrate. A general idea of the substances which are less soluble in alcohol than in water is a good acquisition to the dispenser. This is the case with many colloidal substances ; pepsin, for example, is precipitated from its solutions by 25 per cent. of alcohol.

Precipitation is almost as important as solution, for knowledge of the conditions controlling it is of distinct value in enabling the dispenser to judge when he may or may not filter mixtures. All the conditions which determine precipitation cannot be dealt with here, but it may be noted that saline substances tend to throw extractive matters out of solution. For

example, if one were to saturate a fresh and cold vegetable infusion with magnesium sulphate, a muddiness would be produced which in few cases would be due to precipitation of active principle ; on the other hand, the alkaline sulphates are employed for precipitating pepsin from its aqueous acid solution. Acids, alum, and some other substances are employed to secure more complete precipitation of resinoids. Alkalies are the best precipitants of most alkaloids, but they have a wonderful effect in clearing many aqueous mixtures, especially those containing traces of resinous and glucosidal bodies.

Applying such facts as these to dispensing, there should be some hesitation in filtering mixtures in which a precipitate forms in the course of compounding ; but one would not hesitate to filter a tincture of *nux vomica* and acid mixture, because the precipitate cannot be the active principle, but traces of resin and fat which are soluble in the alcohol of the tincture and insoluble in the aqueous and acid liquid. Other instances of trivial and potential precipitations which call for the dispenser's attention will be noticed later.

Scale Preparations can with care be readily and easily dissolved in the bottle in which they are to be dispensed. A little of the water or aqueous vehicle should be put into the bottle first, being careful not to wet the neck ; or, if this be done, dry the glass with a cloth, else the scale preparation will adhere and block the neck of the bottle. A solution is readily formed if the salt falls upon the water and is quickly agitated—not allowed to ‘cake’ at the bottom.

There are exceptions to every rule, however, and the slow solubility and extreme frothiness on agitation of sulphate of *beberine* with water mark it out as a decided exception to the other scale preparations. The better plan with this salt is to rub it down into fine powder in the mortar, then add water with constant stirring so as to prevent it forming an adhesive mass on either mortar or pestle. If this be done properly, it will dissolve quickly and without the least trouble ; if any other plan be tried, it will certainly cake and cause

no end of trouble. A few drops of diluted sulphuric acid is—or was (for beberine is almost extinct)—sometimes added.

Ferrum tartaratum dissolves with difficulty in cold, but very readily in hot, water. The most satisfactory method of manipulation is to put it in a dry mortar and pour hot water over it, when it goes down with the least possible trouble. With distilled water it gives a perfectly clear solution, but with tap-water the solution never becomes clear.

A Supply of Hot Distilled Water is a great convenience at the dispensing-counter. Where space permits, a gas-stove and boiling-vessel (preferably with a tap) of suitable size should be set apart for this purpose, and the heat adjusted so as to keep the water nearly boiling. A small vessel may be fitted over the sealing gas-jet, thereby utilising its waste heat. An extremely useful arrangement is a circular ring tripod, 8 inches in diameter, fitted with a set of water-bath rings; the legs of the tripod should be of such length that the top of the gas-flame, when full on, reaches a little higher than the rings. The exact quantity of water required should be placed in an evaporating-basin, resting on the tripod (using a ring of smaller diameter than that of the surface of the water) and set over a gas-stove; then, by the time the labels are written and the solid ingredients weighed, the hot water is ready.

CONCENTRATED MIXTURES, ETC.

Where much dispensing is done daily, and there is an occasional 'rush,' the need for keeping certain articles ready prepared is universally recognised. It is even more necessary in cases where dispensing is spasmodic, but the difficulty of keeping certain articles fresh is considerable. This is especially the case with aqueous mixtures, which begin to ferment after a few days. Some of these keep well in a concentrated condition, and other articles may also be kept ready for diluting or massing as the case may require. The following hints may be useful to some who have not seen the ideas carried out in practice. It is a great help to expeditious dispensing to have ready prepared mixtures which a

frequently ordered by local physicians, and generally it is possible to make these of the 1-to-7 type so that they may be diluted with an aqueous vehicle as required.

Liquors for Syrups.—Many syrups which are rarely required, and which are apt to decompose on keeping, may be prepared from the liquors, provided the dispenser assures himself that the finished product is similar to the official one, and does not contain added preservatives which may interfere with other ingredients in dispensing. Such liquors are now easily obtainable.

Mist. Ammoniacy.—A 1-to-7 preparation is made by taking 1 ounce of picked white tears of the gum resin, powdering, rubbing down with $1\frac{1}{2}$ ounce of water, and adding syrup of tolu to 4 ounces. In dispensing add 1 part of this to 7 parts of water.

Mist. Cretæ.—The powders for chalk mixture may be kept ready mixed, so that $\frac{3}{4}$ ounce and 15 grains of the powder with $7\frac{1}{2}$ ounces of cinnamon-water will make *mistura cretæ*.

Mist. Ferri Co.—Use only picked pieces of myrrh for this—good rich ambery and oily like pieces—and powder fresh. Proceed as directed in the B.P., but omit the ferrous sulphate, which add in proper proportion to the emulsive mixture when it is dispensed.

Spt. Ætheris Nitrosi.—Concentrated preparations of nitrous ether are more prone to decomposition than the B.P. spirit *when exposed* to the air and light. If, therefore, concentrated preparations are employed at the dispensing-counter, they should be used in the diluted state only, and the greatest care should be taken to ensure their preservation by keeping in small, well-stoppered and inverted bottles in a cool, dark place. Amber-glass bottles are best.

Syr. Croci.—A concentrated infusion (1 to 4) saturated with chloroform keeps much better than the syrup.

Syr. Ferri Iodidi.—This is now largely prepared from the liquor (1 to 7), which is kept permanently bright and free from oxidation by means of a trace of hypophosphorous acid.

Syr. Ferri Phosph.—This darkens very much on keeping, but a concentrated solution of pure iron in phosphoric acid eight times the strength of the syrup changes very slowly, especially if kept in bottles quite full. This may be diluted with simple syrup as required.

Syr. Ferri Phosph. c̄ Quin. et Strych.—This also darkens rapidly, but if the ferrous phosphate be omitted and the syrup made up to 7 parts instead of 8, and filtered through paper, a brilliant syrup is obtained which keeps indefinitely. Seven parts of this should be mixed with 1 part of liquor ferri phosph. as required.

Syr. Rhœados and **Syr. Violæ**, unless in frequent demand, are much better made from liquors.

There are many other preparations which may be conveniently kept in the concentrated or 'liquor' form. Some manufacturers have made this class of preparations a speciality. It would be out of place to speak of their products here, but it may be said that if the dispenser is seldom called upon for certain preparations, such as syrups, which on keeping undergo apparent alteration, these may be kept in stock in the permanent 'liquor' form, to be diluted as required. The dispenser should, of course, satisfy himself that the finished product answers to the official requirements.

FURTHER MEMORANDA.

Acacia is rarely prescribed *per se* in mixtures, and when it is it may be as either an emulsifying or a suspending agent. If the former, either the powder or the mucilage may be used, according to the nature of the substance to be emulsified; if for suspending, use the mucilage. For making mucilage small picked gum ('Trieste grain,' it is called) is excellent. Allow it to macerate in the water till dissolved, aiding the solution by occasional stirring with a bone spatula. Strain through muslin. This mucilage will keep any reasonable length of time, and is

remarkably clear and bright. Flake or scaled gum is also good.

An excellent plan for making and preserving acacia mucilage is to keep two wide-mouthed bottles—of capacity equalling two or three days' supply of mucilage—one with a tin cap to dispense from, the other corked for making, and labelled with the quantities of ingredients that will fill it; when filled, lay the bottle on its side in a drawer which is frequently opened and shut, then the gum soon dissolves. When the dispensing-bottle is empty, thoroughly cleanse it, strain the reserve supply into it, and start a fresh batch in the making-bottle. Five to 10 minims of formalin to the pint keeps mucilage for a long time.

Bismuth Salts.—The subnitrate and salicylate readily give up part of their acid when treated with water, and the result is that unexpected difficulties sometimes occur which trouble the unreflective compounder. The salicylate may be entirely freed from salicylic acid by washing with alcohol or water.

Butyl-chloral Hydrate dissolves so slowly in water (its solubility is 1 in 50) that it is usual to expedite solution by heating. Care should be taken not to use water exceeding 170° F. in temperature, otherwise the solution is opalescent and more acrid to the taste than when cold water is employed. Glycerin is the best solvent. *Avoid alcohol*, which forms insoluble butyl-chloral alcoholate.

Caffeine Citrate forms a clear syrupy solution with three times its weight of water, but on adding more water caffeine hydrate is precipitated, and does not dissolve until more than ten times the original amount of water has been added and the mixture well agitated. The salt is, therefore, easily dissociated.

Calamine for face-lotions should not have a pink colour. One of the best varieties has a tint which is undetectable on the skin.

Carbon Bisulphide B.P. has an odour resembling that of chloroform. A bad odour is due to excess of sulphur.

A little mercury kept in the bottle combines with free sulphur and keeps the bisulphide sweet without injuring the liquid. The bisulphide should be kept in opaque bottles away from sunlight in order to minimise decomposition.

Copaiba varies greatly in viscosity, some kinds being almost limpid. These should not be used for pill-making. The best copaiba for pills is the thick Maranham kind. Viscosity is inversely proportionate to the amount of essential oil in the copaiba.

Extract of Belladonna.—Dispensers should be careful in regard to what they give for this. Ext. belladonnæ viride, B.P. 1898, is the extract made from the juice of the fresh plant, and varies in alkaloid from 0.5 to 2 per cent. ; the B.P. 1914 replaced this with alcoholic extract of dried leaves, which is a powder containing 1 per cent. of alkaloid. The alcoholic root extract of the 1898 B.P. is no longer official, but is made extemporaneously from the liquid extract for the plaster.

Ferri et Strychninæ Citras.—There are two commercial varieties of this, one green, the other brown. The former is preferred. It contains 1 per cent. of strychnine.

Ferrous Sulphate.—A very small amount of sulphuric acid in aqueous solution of this salt serves to keep it bright and green. For pills the dried salt makes a better and less crumbly mass than the powdered crystals.

Gelatin. varies considerably in gelatinising-power, and compounders should always keep to the brand which they have found to meet their requirements, as a change may greatly alter the character of jellies, suppositories, and the like.

Glucosides.—Most of the medicinal glucosides undergo hydrolysis somewhat readily, especially when alcoholic preparations of them are mixed with water. Unexpected therapeutic results sometimes occur. For example, tincture of strophanthus in aqueous mixture becomes in a short time so changed as to set up intestinal irritation.

Glycerin is a useful and powerful solvent, acting at the same time as an antiseptic. It is largely used as a sweetening-agent in mixtures. It is the best and most appropriate solvent and preservative of the peptic and pancreatic ferments. Pill-masses containing a little glycerin do not harden, but care must be taken to avoid excess, as too much makes the pills hygroscopic. For dispensing it is best kept diluted with an equal volume of water, as then it is easily poured, and there is less loss from part of it remaining in the measure.

The following table shows the capabilities of glycerin as a solvent. It represents the weights in grains of the substances named which dissolve in 1 fluid ounce of glycerin sp. gr. 1.260, heat being used to promote solution :—

Substance	Weight	Substance	Weight
Acid. arsenios. . . .	100	Morphinæ acetat . . .	100
„ benzoic. . . .	50	„ hydrochloridum . . .	60
„ boric. . . .	110	Phosphorus	1
„ gallic. . . .	40	Plumbi acetat	100
„ salicylic. . . .	2 $\frac{1}{4}$	Potassæ sulphurata . . .	50
„ tannic. . . .	250	Potassii arsenas	240
Alumen	200	„ bromidum	120
Ammonii carbonas . . .	100	„ chloras	17 $\frac{1}{2}$
„ chloridum	100	„ iodidum	200
Antim. tartarat. . . .	20	Quinina	2 $\frac{1}{2}$
Atropina	15	Quininae sulphas . . .	10
Atropinæ sulphas . . .	160	„ tannas	1
Barii chloridum	50	Sodii biboras	300
Calcii sulphidum	25	„ bicarbonas	40
Cinchonina	2 $\frac{1}{2}$	Strychnina	1 $\frac{1}{4}$
Cinchoninae sulphas . .	33	Strychninae nitras . . .	20
Cocainæ hydrochloridum	145	„ sulphas	100
Cupri sulphas	150	Sulphur	1
Ferri sulphas	120	Sulphuris iodidum . . .	8
Ferrum tartaratum . . .	40	Veratrina	5
Hydrargyri ioidid. rub. .	1 $\frac{1}{2}$	Zinci chloridum	240
„ perchlor. . . .	35	„ iodidum	200
Iodum	7 $\frac{1}{2}$	„ sulphas	160
Morphina	2 $\frac{1}{4}$		

Solution is not effected quickly in pure glycerin, as its thickness prevents diffusion, which is necessary in practice. Glycerin solutions which are used as topical applications have given

results obtainable by no other preparations of the same active constituents, but recent observations have proved that these are due to the glycerin itself, which stimulates the osmotic process in cellular tissue, and so relieves congestion. The use of glycerin suppositories and injections for constipation is a familiar example of this.

Iodine dissolves in water only slightly, but is freely soluble in aqueous potassium-iodide solution. It is soluble in alcohol, ether, chloroform, carbon bisulphide, glycerin, and fixed and essential oils. With fixed oils it chemically combines to a small extent, also with essential oils, and some care should be observed in mixing it with the latter or their alcoholic solutions. Free iodine is not often given internally, but if it occurs in a prescription for an aqueous mixture without any solvent see the prescriber, and suggest the addition of sufficient potassium iodide to dissolve the iodine.

Manna is rarely required in solution in English practice, but in continental dispensing it is more needed, especially in Germany. Direct heat should never be applied to effect its solution. Allow the manna to macerate in just as much cold water as will change it into a soft pasty mass; then add the rest of the water required and dissolve by a gentle heat. Strain through fine muslin. Squire recommends manna to be purified by dissolving it in as little water as possible, straining, and evaporating to the original weight. Manna is sometimes given along with magnesium sulphate in mixture; in this case beat up the manna with the sulphate, then add the water and dissolve.

Morphine Salts should be dissolved without heat, for at a temperature above 104° F. (40° C.) their solutions are apt to turn yellowish or even brown. With care beautiful solutions may be made. Morphine meconate is least affected by heat, but the solution of this salt should only be filtered through paper which has previously been washed free from iron by means of hydrochloric acid and water, otherwise the solution

will be coloured red. The following are the better-known salts of morphine and their solubility in water at 60° F. (15·5° C.):—

Acetate	[B,C ₂ H ₄ O ₂ ,3H ₂ O],	1 in 2½
Hydrobromide	[BHBr,2H ₂ O],	1 in 25
Hydrochloride	[B,HCl,3H ₂ O],	1 in 25
Lactate	[BC ₃ H ₆ O ₃],	1 in 8
Meconate	[B ₂ C ₇ H ₄ O ₇ ,5H ₂ O],	1 in 40
Oxalate	[B ₂ C ₂ H ₂ O ₄ ,H ₂ O],	1 in 20
Sulphate	[B ₂ H ₂ SO ₄ ,5H ₂ O],	1 in 21
Tartrate	[B ₂ C ₄ H ₆ O ₆ ,3H ₂ O],	1 in 11

In these formulæ B stands for the morphine molecule C₁₇H₁₉NO₃. Morphine acetate is the least stable of the salts of the alkaloid, and the tartrate is best for hypodermic solutions because it is stable and exceptionally soluble.

Nitroglycerin.—Although this is a pharmacopœial article no pharmacist may undertake its preparation without first obtaining the sanction of the Home Office. Permission is not at all likely to be obtained. A 10-per-cent. alcoholic solution can be purchased from wholesale houses.

Physostigmine Salts and their solutions become red on exposure to the air, through formation of rubeserine owing to action of ammonia in the atmosphere. A mere trace of hypophosphorous acid added to the solutions (a single drop of 10-per-cent. acid to the ounce) prevents the change of colour. Extract of Calabar bean is sometimes prescribed in aqueous solution. This should have 1 grain of salicylic acid added to each ounce, and should be filtered, as the water-insoluble matter is merely fat and resin, which would irritate the eye.

Quinine Salts.—Of all the salts of quinine the sulphate is most used. It is one of the least soluble of the salts. Other salts are prescribed either owing to their combination with a special acid (such as valerianic acid) or because the prescriber has some special reason for preferring them. It

may be useful to summarise here the properties of the more important salts of the alkaloid :—

Quinine, $C_{20}H_{21}N_2O_9 \cdot 3H_2O$. Practically insoluble in water.

Acetate. Soluble in water, but, like caffeine citrate, hydrolyses with separation of quinine hydrate. Contains 84 per cent. of quinine.

Arsenate. Soluble in hot, sparingly soluble in cold, water. Contains 69.4 per cent. of quinine.

Benzoate. Soluble 1 in 373 of water. Contains $72\frac{1}{2}$ per cent. of quinine.

Carbolate. The salt generally sold as such is a sulphocarbolate containing $75\frac{1}{2}$ per cent. of quinine. More soluble than the sulphate.

Chlorhydrophosphate. Soluble 1 in 2 of water. Contains 50 per cent. of quinine.

Chlorhydrosulphate. Soluble in a little over its own weight of water. Contains 74.2 per cent. of quinine.

Citrate. Two salts—(1) neutral or dibasic is less soluble in water than the sulphate (about 1 in 1,000 or less), and contains $72\frac{1}{2}$ per cent. of quinine; and (2) the acid or monobasic citrate, soluble 1 in 650 of water. The former is the commercial salt.

Glycerophosphate. Soluble 1 in 353 of water. Contains 6 per cent. of quinine.

Hydriodide or Iodide. (1) Neutral, soluble about 1 in 900 of water; (2) acid, soluble 1 in 20 of water.

Hydrobromide. (1) Neutral (the commonly used salt), soluble 1 in 45 of water, contains 76 per cent. of quinine; (2) acid salt, soluble 1 in 7, contains 60 per cent.

Hydrochloride. (1) Neutral, soluble 1 in 36 of water, contains 82 per cent. of quinine; (2) acid salt, soluble less than 1 in 1 of water, and contains 72 per cent. of quinine.

Hypophosphite. Soluble 1 in 250 of water.

Lactate. Soluble about 1 in 10 of water. Contains 78 per cent. of quinine.

Phosphate. The English salt contains 76 per cent. of quinine, the German contains 79 per cent.—*i.e.*, 1 of phosphoric acid to 2 of quinine, the English being 2 to 3. The English is soluble 1 in 420 of water, the German 1 in 784.

Salicylate. Soluble 1 in 225 of water. Contains 70 per cent. of quinine.

Sulphate. (1) Neutral or B.P. (the 'quinine' of the public), soluble 1 in 800 of water, contains 73.5 per cent. of quinine; (2) acid salt (into which the former is converted on mixing with sulphuric acid and water), soluble 1 in 11 of water, and contains 59 per cent. of quinine.

Tannate. Insoluble in water, therefore tasteless. Contains 20 per cent. of quinine.

Tartrate. The commercial or neutral tartrate is less soluble in water than the sulphate, but the acid tartrate is very soluble.

Valerianate. Soluble 1 in 110 of water. Contains 51 per cent. of quinine.

For the dispensing-counter it is a good plan to rub down quinine sulphate in a mortar, so as to get it into smaller bulk, when it is more easily weighed. Dispensing-solutions should not be made stronger than 4 grains in 1 fluid drachm, 4 minims of dilute sulphuric acid being used to dissolve the sulphate.

If a prescription contain nothing which will dissolve the quinine sulphate, the salt should merely be rubbed down, suspended in the water, and a 'shake the bottle' label used. If you know that the prescriber wishes acid to be added, add it and note the fact on the prescription. Never dissolve quinine sulphate with hydrochloric acid if that acid is not ordered: such a solution is not fluorescent, and if the prescription happens to have been dispensed before with sulphuric acid, the patient may notice the difference.

Quinine sulphate is soluble 1 in 40 of glycerin, and this combination has been suggested as a means of getting over the acid difficulty, also to give the dose in sweet spirit of nitre, an ounce of which dissolves 20 grains of quinine sulphate. This latter combination is used in fevers. Such suggestions are now out of date, as the readily soluble hydrochloride is better pharmaceutically and therapeutically.

Quinine salts are prescribed on the Continent in combination with extract of liquorice. In this case first dissolve the extract in ten times its weight of water, then add the solution of quinine, as both the alkaloid and the acid tend to throw out a dirty-looking precipitate of glycyrrhizin.

Salicylic Acid and Salicylates.—The question occasionally crops up whether natural or artificial acid should be or has been used, owing to the practice in a few dispensing houses of using the former. Between the 'physiologically pure' artificial acid (which is 'B.P.') and the natural there cannot be detected any difference in therapeutic action; and as the British Pharmacopœia permits either to be used, the dispenser must allow common-sense or sentiment to decide the matter

for him. Artificial salicylate of sodium is white ; the natural salt is creamy in colour. The red to brown colour produced in salicylate mixtures containing spirit of nitrous ether never becomes quite so dark with the natural acid (see page 299). Salicylic acid dissolves to a slight extent in water (1 in 500), but very readily in solution of ammonium acetate. In the latter case ammonium salicylate is really formed, acetic acid being set free. So also when other alkali salts of organic acids are combined with salicylic acid. Some salicylates are but slightly soluble in water—*e.g.*, antipyrin salicylate or salipyrin—and when the readily soluble sodium salicylate is added to an equally soluble body (by itself) the mixture may not be clear. The powerful antiseptic property of salicylic acid suggests its addition to solutions which are prone to decomposition ; when so used it is a good plan to prepare salicylic water by boiling a pint of distilled water in a flask and adding to it 16 grains of the acid, plugging the flask with a piece of cotton wool which has been scorched in the Bunsen flame, and setting aside to cool. This water is sterile, antiseptic, and saturated with salicylic acid. Microbes cannot live in it, but it is possible to introduce along with the microbes something upon which they may live, as is the case with ergotin.

Silver Nitrate in solution should be sent out in amber-tinted glass bottles, which glass minimises the action of light on the solution, and, being more transparent than blue-glass bottles, the contents may be more easily seen.

Silver Oxide parts with its oxygen so readily when brought into contact with certain organic matters as sometimes to induce an explosion. The subject is fully treated in the section on pills ; but here the student is especially warned regarding the reducing-power of the compound.

Spirit of Nitrous Ether is one of the most troublesome products which the dispenser has to handle ; but during the past thirty years much light has been thrown upon it, so that it is no longer the 'dark continent' that it was to our forefathers. The spirit is essentially a solution of ethyl nitrite

and aldehyde in rectified spirit. When fresh there is little aldehyde in it (less than $\frac{1}{2}$ per cent.), but the water in the rectified spirit, under the influence of light and air, decomposes the ethyl nitrite, $C_2H_5NO_2$, which splits up, forming alcohol and nitrous and nitric acids. The acids at once react with alcohol to form fresh ethyl nitrite and a little aldehyde; some of the ethyl nitrite evaporates. As some of the nitrous acid remains in the spirit for a long time, when it is compounded in a mixture with an alkaline iodide, the acid and iodide react, nitrite of the alkali being formed, and iodine and nitric oxide liberated. This reaction, which has been the bugbear of dispensers for generations, is utilised by the Pharmacopœia to estimate the percentage of ethyl nitrite in the spirit by measuring the volume of nitric oxide evolved (see page 241). Spirit of nitrous ether should be kept in well-filled and inverted bottles, and the dispenser should bear in mind that although it is a weak diuretic it is a powerful chemical agent, especially prone to decomposition through mixture with water, which simply hydrolyses the ethyl nitrite. The old-fashioned prescriptions for diaphoretic mixtures such as the following were really scientific :—

Liq. ammon. acetatis	.	.	.	.	3ij.
Spt. æther. nitrosi	.	.	.	.	3j.
Spt. chloroformi	.	.	.	.	3ij.
Aquam	.	.	.	.	ad 3viiiij.
M.					

Hydrolysis (or decomposition) of the ethyl nitrite quickly begins in this mixture, but the nitrous radicle as soon as it is liberated combines with the ammonia of the ammonium acetate, hence the mixture retains a large measure of its potency because the ammonium nitrite has the same, though milder, action upon the arterial system as the ethyl nitrite.

In mixtures containing antipyrin and spirit of nitrous ether, the latter, if acid, reacts with the former, iso-nitroso-antipyrin and a cyanogen compound being amongst the products, and the mixture becomes green. Some dispensers keep a crystal or two of potassium bicarbonate in the spirit, and thus have it always neutral; that does not of course prevent decomposition

of the ethyl nitrite, but as hydrolysis proceeds nitrite of the alkali is formed and retained in solution, so that the spirit may on analysis show less loss than when alkali is not employed.

Sugar for pharmaceutical purposes should be the kind made from cane. It is purer and less liable to alteration than beetroot sugar. It rarely happens that solid sugar is prescribed, except in the form of *pulv. sacchari albi* in powders. Should it occur in any mixture, the best plan to follow is to take the equivalent of *syrupus* B.P., ʒix. of which is equal to ʒi avoirdupois ounce of sugar, or m̄lxxiv. equals 60 grains of sugar.

Sulphonal.—The light powder should be used for dispensing in preference to the heavier crystals, because the former dissolves more easily.

Tannic Acid does not readily yield a bright solution with water ; a stock-solution (ʒi in 2 of proof spirit) may be used, and yields, with water free from ammonia, a brilliant solution of a light-yellow shade. Tap-water makes an opalescent solution.

Zinc Chloride of commerce contains some basic salt, so that when treated with water the chloride does not completely dissolve. It should be strained from the insoluble oxy-chloride, and no attempt should be made to clear it by the addition of acid.

Dispensers should remember that the water of crystallisation in many chemicals suffices, when certain of them are mixed, to produce apparent decomposition. This fact is taken advantage of sometimes, as in the granulation of effervescing preparations, where the water of crystallisation in the citric acid leaves it to join the sugar or alkali, thus helping to mass the mixture. There are many similar instances. The liquefaction of camphor and chloral hydrate, phenol and quinine sulphate, and many other organic substances, when mixed together, is not of the same nature, but appears to be due to molecular rearrangement in some cases, and to actual chemical change in others.

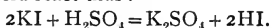
Young dispensers should write for themselves paragraphs similar to those in this chapter regarding peculiarities in chemicals and drugs which they may observe or learn. There

is much to be gained by a methodical system of annotation, as the following example from our own note-book proves :—

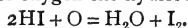
Potassii iodidi	3j.
Quininae sulphatis	gr. viij.
Acidi sulphurici diluti	℥xxiv.
Aquam	ad 3xij.

Fiat mistura.

Some dispensers get a water-white mixture from this, others cannot get it without free iodine ; and even the water-white mixtures, when exposed to air and light, slowly acquire a brown colour and iodine odour. This is what might be expected when the fact is considered that potassium iodide and sulphuric acid react thus :—



This takes place even in dilute solutions, especially when exposed to sunlight, and in presence of oxygen the hydriodic acid changes thus :—



The iodine thus liberated reacts with quinine to form an iodo-quinine, which crystallises in brown needles, and is a combination of four molecules of quinine with five atoms of iodine.

Thirty years ago a foreign chemist made a long series of experiments on the behaviour of acidified potassium-iodide solutions when exposed to light, and he conclusively demonstrated that all the mineral acids, even when very dilute, ultimately liberate iodine. Since then numerous studies of iodine and iodides have put it beyond dispute that the molecules KI and H_2SO_4 cannot exist together in presence of water, at least indefinitely, as the affinity between K and SO_4 is greater than that between K and I.

These facts can scarcely be missed in the course of study for the pharmaceutical examinations, and one has only to apply the knowledge to avoid disputes as to which kind of mixture is right. The iodide that gives the water-white mixture is alkaline in reaction.

This chapter is a direct proof of the remark made earlier—that the art of dispensing is the focussing upon the compounder's duties of the knowledge of chemistry and kindred subjects required by the Boards of Examiners. The connection between the laboratory bench and the dispensing-counter is exceedingly intimate, and the cleverest pharmacists find in compounding a ceaseless source of suggestive inquiry and professional pleasure.

PILLS AND THEIR EXCIPIENTS.

GENERAL OBSERVATIONS.

A **PILL** is a mixture of substances, generally powders, with a sufficiency of a paste or liquid of some kind to bind it into a spherical mass. The active ingredients may be liquids (*e.g.*, essential oils), pastes (*e.g.*, extract of belladonna), or powders (*e.g.*, quinine sulphate or powdered rhubarb); but, whatever the active substances are, a powder of some kind is generally contained in pills.

The preparation of good pills always requires much practical judgment and experience, and is, indeed, one of the most important parts of pharmacy, for it is here that the prescriber depends upon the superior knowledge of the pharmacist.

The characteristics of well-prepared pills are (1) they are not too soft, (2) do not stick together nor flatten, (3) are smooth and round, (4) are all of the same size, and (5) all contain similar proportions of the ingredients. These characteristics are not the sole objects to aim at, however. The dispenser has to remember that a pill is a thing which has to do something, and that in the process of making it elegant its therapeutic properties may be annihilated by (1) the production of an insoluble mass or (2) using an excipient for the active ingredients which induces chemical change. A general knowledge of the therapeutic action of drugs is of service in this connection, especially as to whether a remedy is expected to exert its influence in the stomach or other parts of the alimentary canal. It is possible to localise the action, and necessary in some cases. For example, pills of pepsin must dissolve in the stomach because the action of the ferment is only exerted in an acid medium; on the other hand, purgative medicines need not, if in pill form, begin to dissolve until they

reach the duodenum or intestine, hence they are frequently made somewhat hard.

It is advisable to dispense pills of the weight prescribed, and as inspissation is inconvenient at the dispensing-counter, this object is attained by keeping the more common extracts both in a soft condition and in a state sufficiently hard to roll into pills with but little addition of powder. Ext. coloc. co. may conveniently be kept in powder form, as may also several pill-masses—*e.g.*, pil. asafet. co., pil. cambog. co., pil. aloes et ferri, pil. aloes et myrrhæ, pil. hydrarg. subchlor. cò., and pil. rhei co. State clearly on the label how much of the pill-mass the powder is equivalent to—for example, 'Pulv. pro pil. hydrarg. subchlor. co., 4 grains equal $4\frac{1}{2}$ grains of pill-mass.'

Before rolling out the mass into pills it is a good plan to weigh it in order to see that it corresponds with the total weight of the ingredients. This is a wise precaution, and especially checks careless weighing. Unless the prescriber order to the contrary, it is advisable to make up to 1 grain all pills less than that in weight. This is done by adding some inert powder, such as liquorice or sugar of milk, with an appropriate excipient; and if a note is made in the prescription-book, and on the prescription, of the size of the pills, it ensures the same size pill always being dispensed. In Germany pills are seldom prescribed above 2 grains each in weight, and this also is the tendency of British pharmacy.

Where no excipient is ordered the simplest should be selected, and that which least augments the size of the pill. Generally speaking, a dispenser has one excipient that he prefers and uses in the majority of cases. It may not be the best in every case, but, because he is in the habit of using it, and knows well its massing-powers, he can produce better results with it than with any other. Citrate of iron and quinine, for example, may be made into a good working mass and keeping pill with almost any excipient not having glycerin for its basis; but if a dispenser tries to make a mass of it with an excipient which he is not in the habit of using, the chances are that the attempt will end in failure. It is necessary to point

this out, as in many of the cases afterwards mentioned we should not consider the excipients recommended the best unless this element of familiarity in their use were also taken into consideration.

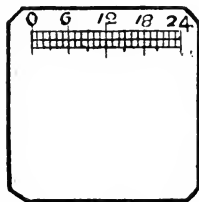
To make pills that will keep their shape for a reasonable time they ought to have some fibrous vegetable powder in their composition. Where such is not ordered the dispenser has often to use it, but, of course, what he uses must be both medically and chemically inert. Paper-pulp—blotting-paper or filtering-paper scraped into fluff—has also been recommended.

For massing pills a Wedgwood mortar and pestle with a narrow head and long handle are best. The fat-headed pestle with short tapering handle does not enable the compounder to exert the kneading force and leverage which are obtained with the modern pill-pestle. A short strong spatula, such as is here

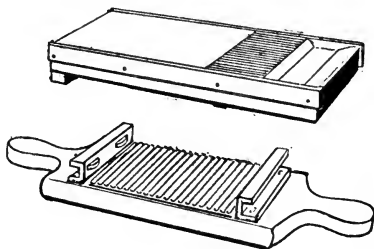


illustrated, is also necessary. It should be straight across at the point and sharpened so as to scrape well. Most pill spatulas supplied by sundries houses are too thick at the point. Flexible spatulas have a short life at the dispensing-counter.

Rolling.—The pill-tile and the pill-machine are the next instruments required in pill-making, for the purpose of dividing



PILL-TILE.

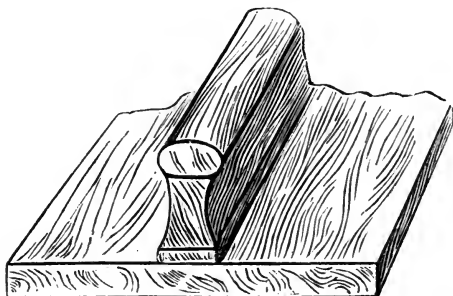


PILL-MACHINE.

the mass into the requisite number of parts. The tile is an exceedingly useful bit of apparatus in the hands of some

dispensers, for they can with the spatula roll and cut a tiny mass on it quicker than with the machine. Where little dispensing is done, so that there is not a variety of rolling-machines, the tile is virtually indispensable. The form of pill-machine almost universally used is also illustrated. The kind with adjustable edges and the tray movable is the best. For oval pills the cutters are made wider and shallower. In cutting the roll should occupy fully the number of spaces actually required.

It is difficult to roll a mass for 1 or 2 grain pills upon a 4 or 5 grain pill-machine. To meet this disadvantage the pill-roller next figured in section has been suggested. This little



instrument is a roller made of hard wood 3 inches broad, and as long as desired, the handle being securely fixed into the bottom piece with glue.

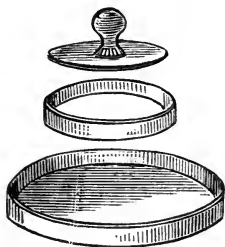
Another good idea for a roller is a piece of beechwood about $\frac{3}{8}$ inch thick, 6 inches long, and 4 inches broad. A leather strap is nailed to each side, and goes across the top. Under this four fingers of the hand are placed, and the thumb fits on one side to steady it. For working up masses or rolling weighed portions into pipe it is excellent, because the pressure can be applied as desired.

Still another idea has been put forward. It is to insert into the bed of the machine a piece of mahogany board (about $\frac{1}{8}$ inch thick) made the required size so that it may slip into

the machine and be a tight fit. By this arrangement the ordinary roller can be used, and 1-grain pills are rolled out quite easily. The same end is attained by the machine with adjustable sides ; the disadvantage of it is that the cutters are too wide, and each pill has to be rounded with the fingers.

Rounding.—Pills are generally rounded with a pill-rounder. Rounding pills with the fingers is only permissible in such a case as has just been mentioned or when the mass crumbles under the rounder—which is not good pharmacy. The ordinary rounder has a deep and a shallow side, so that large and small sizes may be rounded with it ; but if either side is too deep, a piece of cardboard may be inserted. The French pill-roller shown below can be adjusted to suit any size of pill. The cut pills are laid on the tray, sprinkled with a little powder, and, when covered by the roller, are rapidly, and with slight pressure, revolved.

Powder is used to prevent pills sticking to each other, and, to some extent, to conceal their taste. When no particular powder is ordered, lycopodium is used in Germany. Cinnamon, liquorice, magnes. carb. levis, French chalk, and a mixture of starches are all used—the French chalk, perhaps, more than any other. The objection to it is that it makes the slab very slippery; but this can be overcome by the addition of a



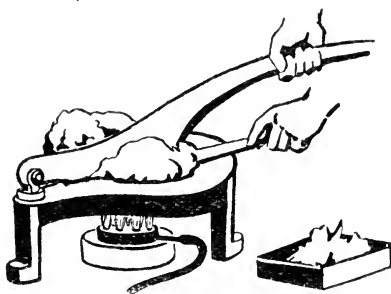
little powdered starch. Two parts of powdered starch and one of French chalk make a good pill-powder ; another is a mixture of equal parts of powdered sugar and cornflour. Use a powder-dredger for distributing. A pill-sieve is sometimes employed to remove excess of powder.

Pills with hygroscopic, strong-smelling, or volatile ingredients should always be dispensed in bottles.

Small Quantities of ingredients, such as a fraction of a grain of a powerful medicament (strychnine, mercury per-

chloride, &c.), should be intimately mixed with sugar of milk and massed with soft manna. Sugar of milk, in crystals or coarse powder, is most useful for dividing any active ingredient when making pills. A mortar and pestle with perfectly smooth grinding-surfaces should be selected, and the strychnine (for example) lightly powdered; an equal quantity of coarse sugar of milk should be added, and lightly triturated until none adheres to the mortar; then powder carefully, add a little more coarse sugar of milk, triturate lightly until mixed and detached from the mortar, then powder, and mix thoroughly with any other powders that may be ordered in the pill.

Hot-plate.—A casserole water-bath (see page 184) is convenient for evaporating certain pill-masses to suitable consistence, adding a little tragacanth if necessary. Many operations in pill-making, especially in the case of large masses, are greatly facilitated by the use of a smooth slab of iron—say, 9 inches square of $\frac{1}{4}$ -inch boiler-plate; it is quickly warmed over a gas-furnace, and as soon as the plate is hot enough (as may be judged by the finger) the gas is put out, and the mass placed upon it. The mass is then thoroughly kneaded with a



HOT-PLATE FOR PILL-MASSSES.

spatula. The illustration given here shows the hot-plate kneader made by Pindar and the manner of using it. Pill-manufacturers employ this apparatus for massing some kinds of pills, such as those containing much aloes, colocynth,

asafetida, or galbanum. It is useful to employ heat in massing resinous substances, which are hard and brittle in the cold. They may be rolled on the hot iron slab and made into pills without the aid of a liquid excipient, but most of them require the addition of fibrous material, such as liquorice powder or lycopodium, to prevent their falling. The hot-plate should not be used for masses containing aromatic or other volatile active principles.

Substances which are decomposed by iron, such as corrosive sublimate, calomel, silver nitrate, copper and bismuth salts, must not be mixed in an iron mortar.

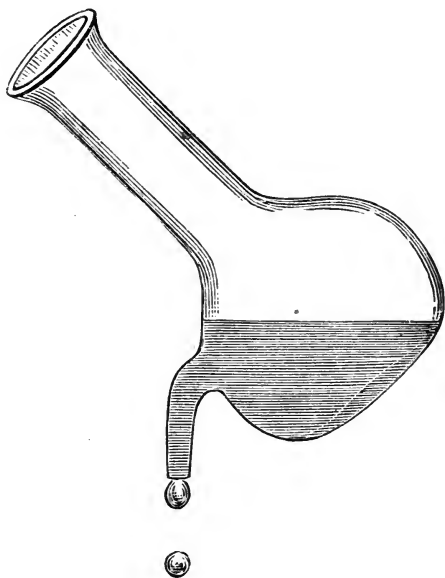
Salts easily soluble in water require very careful addition of any aqueous excipient, and excipients containing glycerin should be avoided or used very sparingly with soluble salts.

Soft Masses.—Crystallised salts, fluid acids, and soft extracts, with a vegetable powder, often make a mass of pasty consistence, which may right itself on standing ten to fifteen minutes. Time should always be given for a vegetable powder to imbibe moisture. For soft masses a desiccator, such as that in use for drying precipitates, &c., in the laboratory, is a most useful adjunct to the dispensing-counter. A very soft mass, cut into pills, and placed in a desiccator over strong sulphuric acid for twelve hours, has frequently turned out well. This treatment is especially applicable when pills contain deliquescent salts. It rarely happens, however, that one can wait a day in order to get a pill of suitable consistency, and such soft masses can more conveniently be dispensed in capsules.

Liquid Excipients.—The illustration, page 83, shows a dropping-bottle which is useful for adding water to pill-masses. An eye-drop bottle, made by inserting a piece of glass tubing, with capillary point, in a perforated cork fitted to a phial or small flask, or a Chalk's drop-bottle, is equally good. At well-appointed dispensing-counters several bottles containing

syrup, mucilage, glycerin and water, glucose syrup, tragacanth paste, and other excipients are kept. The illustration on the next page shows a suitable bottle for the purpose.

When fluids require to be added to form a pill-mass, it is risky to add them direct to the mixed powders from a stock-



bottle, as one may pour in too much; so, when a dropper is not available, drop the fluid excipient first on to the point of the spatula, and from it to the mortar in the necessary quantity.

Pill-masses containing vegetable powders take a few minutes to absorb the added water (as already noted), so that a nice plastic mass may become quite crumbly in ten to fifteen minutes. It is customary, therefore, to make such powders as rhubarb into a rather soft mass at first. If the exact quantity of water or syrup required for massing a powder be known,

the pills may be made of smaller size, and in less time, by adding the required quantity at once, and rapidly mixing and



EXCIPIENT-BOTTLE.

An empty 1-oz. citrate of iron and quinine bottle. The cover made of sheet indiarubber, a little larger than the mouth of the bottle, and the dipping-rod of glass.

cutting before the mass has become too firm by absorption. The addition of the excipient little by little generally adds much to the labour, and not infrequently much also to the size of the pills. This applies to soft excipients, like extracts, as well as to liquids.

If the quantity of extract ordered would make the mass too soft, the dispenser must, if the extract be a potent one, either use it in a drier state or add some inert powder to it. In other cases it is common to use some powder of the same drug—*e.g.*, if 20 grains of extract of gentian were ordered, and it would make too soft a mass, one might use 10 grains of extract with 10 grains of powdered gentian. The best plan, however, is to diminish rather than increase the bulk of the pill, so that when an extract is too soft it

should be evaporated to a proper consistence; and for this reason every pharmacist should have some simple and ready appliance for accomplishing this without risk to the extract. A pill-tile placed over a small water-bath is convenient and rapid. Experience indicates that it is well to make an allowance of 3 or 4 per cent. for loss, as it is practically impossible to scrape *all* the dried extract off the drier. It is well to remember that some extracts are highly hygroscopic after evaporation, and if allowance is not made for this, pills massed with them may become semi-fluid on keeping. Never use the same spatula to scrape the mass from the pestle and to dip into the extract-pot.

EXCIPIENTS.

Acacia Powder by itself is an excipient of very little value for the purpose of giving consistence ; but, with the addition of 10 per cent. of powdered althæa-root, or half its weight of finely powdered liquorice-root, it makes a good binder for soft masses. The pills formed are apt to become hard.

Borotartrate of Potash.—Borax (or boric acid) 1, potassium bitartrate 4, water 24 ; boil until syrupy and scale. An antiquated excipient for salts.

Breadcrumb is regarded by tradition as an excipient for many things. As a matter of fact it is useless, and is never used.

Calcium Phosphate possesses in a remarkable degree the property of giving a greasy substance, such as lard or mercurial ointment, a good pilular consistence, when added in comparatively small quantity. It is also useful for essential oils ; mix it, in this case, with half its weight of wheaten flour.

Compound Decoction of Aloes, especially the concentrated kind, is useful where a considerable quantity of oil has to be combined with a rather soft mass. It is an excellent excipient for most pills containing aloes, but is to be avoided where the potassium carbonate contained in it would prove an incompatible.

Confection of Roses and **Confection of Hips** increase the bulk of pills more than is liked nowadays.

Extract of Malt is a good excipient for general use.

Fullers' Earth is a convenient inorganic and inert powder for massing substances of a fatty nature.

Glucose (Liquid) or **Honey** is a serviceable excipient in many cases. Glucose syrup is now prescribed by the British Pharmacopœia for several pills. It is a mixture of 250 grammes

of liquid glucose of commerce with 500 grammes of syrup. It is not sufficiently adhesive for some purposes.

Glucanth is an excellent binding excipient. It is a mixture of powdered tragacanth $\frac{1}{2}$ ounce, glycerin $1\frac{1}{2}$ ounce, water $\frac{1}{2}$ ounce, and liquid glucose $3\frac{1}{2}$ ounces. Glucose mixtures are good for massing vegetable powders alone or mixed with chemical powders.

Remington's General Excipient is somewhat more binding than the foregoing. It is made by mixing benzoic acid 1 grain, powdered acacia 90 grains, glycerin 1 ounce, and liquid glucose 4 ounces.

Glycerin keeps pills soft, and being a very hygroscopic body itself, it cannot be used with other hygroscopic bodies. Glycerin ceases to exhibit this character when it contains half its weight of water. Whenever it is used alone as an excipient, add sufficient powdered tragacanth to bind *after* the action of the glycerin has taken place, not simultaneously ; but it is better to start with glycerin of tragacanth. Careful dispensers are shy about using glycerin alone in pill-making. It is fatal to the silvering or varnishing of pills. Glycerin 1 part, with treacle 3 parts, is an excellent excipient for pil. aloes et myrrhæ.

Kaolin, being an inert earth, has come into use for combining with oxidisable or reducible substances, such as potassium permanganate, which cannot be massed with extracts or carbohydrates, but with fats, such as lanoline or vaseline.

Kieselguhr (fossil earth) is a splendid absorbent for liquids, and the mixtures formed may be massed with a fat or glucanth.

Liquorice Powder is largely used as an absorbent and slightly binding excipient. Its fibrous nature plays a part in the internal disintegration of the pills. Powdered extract of liquorice is a favourite American excipient.

Manna is as good an excipient as anything for calomel and similar heavy white compounds.

Martindale's Kaolin Excipient for organic and oxidisable substances. Melt together vaseline and hard paraffin, of each 1 ounce, and sifted kaolin 1 ounce, and stir until cold.

Mucilage of Acacia as an excipient should be avoided. It makes pills too hard ; indeed, with some substances (such as calomel) it forms a perfect cement. Many substances do not require the addition of an adhesive excipient—*e.g.*, the extracts of aloes, pulv. pil. coloc. co., pulv. ext. coloc. co., &c., form a good mass with water (about $\mathfrak{m}\text{iv}$. to $\mathfrak{z}\text{j}$.).

Powdered Althæa, if used freely, has a tendency, in consequence of its large proportion of mucilage, to interfere with the solubility of the pills, and to reduce their activity. Besides, it is apt to make a mass too elastic to work well into shape, which hardens too much afterwards. Not more than 1 grain to 5 or 10 grains of the active ingredients should be used. Three parts of powdered althæa require 2 parts of water to form a mass. In German pharmacies the following powders are sometimes kept ready for pills that require a binding excipient :—

FOR WHITE PILLS.

Pulv. althææ . . .	10
Farinæ secalinæ . . .	10
Sacch. alb.	10
Pulv. iridis	70

M. Fiat pulv. subtil.

FOR COLOURED PILLS.

Pulv. althææ . . .	15
Farinæ secalinæ . . .	10
Sacch. alb.	10
Pulv. iridis	50
Pulv. gentianæ . . .	15

M. Fiat pulv. subtil.

Another good excipient powder for such things as carbohc acid is a mixture of equal parts of althæa and liquorice. Some prefer flour with 3 per cent. of powdered tragacanth and, if required, a little syrup to moisten.

Resin Ointment makes good pills of ferri et quininæ citras and similar articles which cake with aqueous excipients.

Roe's Excipient is one of the best for helping to mass essential oils. It is made thus: Soak gelatin 6 drachms in warm water for a few minutes, then drain, put into a dish with glycerin 2 drachms, heat on a water-bath, stir, and bottle. For each 2 minims of oil use 1 grain of melted excipient, and add

wheaten flour, fullers' earth, soap, or compound tragacanth powder to mass.

Soap-powder makes the best pill-mass with vegetable powders, extracts, and gum resins. In using soap care must be taken not to add too much water. Soap-masses at first appear dry and crumbly, so that the dispenser is tempted to add more water, and finds afterwards that he has too soft a mass. A little spirit has a similar effect to a greater extent, so that it must be used very carefully. Powdered curd soap is better than hard olive-oil soap, especially for creosote and essential oils. As soap is decomposed by acid salts, acids, many metallic salts, and tannin substances, it is not suitable for masses containing these.

Spirit should not be used when there is much resin in the pill, and masses made with it should be rolled off very quickly, or they will crumble. Proof spirit is, on the whole, better than rectified spirit for resinous masses.

Sugar without some mucilaginous addition is not good. Syrup, however, with powdered althæa is very useful. Syrup alone makes an excellent mass with powdered rhubarb.

'Dispensing-syrup' is the best form for using sugar. The formula for it is :—

Glycerin	.	.	.	.	.	.	.	1 oz.
Mucilage of acacia	.	.	.	.	.	.	.	1 oz.
Syrup	.	.	.	.	.	.	.	1 oz.

Mix.

This binds (owing to the acacia), keeps the mass from hardening (glycerin) and from oxidation (sugar).

Theriacanth is made thus : Rub 1 drachm of powdered tragacanth with 2 drachms of rectified spirit in a mortar ; then add quickly 2 ounces of treacle (previously made more fluid by warming), and thoroughly mix. This soon sets into an adhesive mass which is excellent for such intractable things as reduced iron. Treacle contains a large proportion of salts (including alkaline carbonate). This should be borne in mind in selecting it or its preparations.

Tragacanth gives solidity and elasticity to a mass which is on the soft side, but if too much be added the pills become so elastic that it is almost impossible to round them. Tragacanth is especially to be recommended when the mass is too soft, and when it is desired not to increase the weight too much. If masses crumble, a little tragacanth powder, with a few drops of glycerin, will bind them.

The compound powder of tragacanth is more to be relied on than the pure gum, especially if the starch be replaced by wheaten flour as in the following :—

Powdered tragacanth	1 oz.
Powdered acacia	1 oz.
Wheaten flour	1 oz.
Powdered sugar	3 oz.

Mix.

This is absorbent, binding, and preservative.

Tragacanth (Glycerin of).—Nothing has yet proved of such general usefulness as this invention of the late Mr. Barnard Proctor, the Newcastle-on-Tyne pharmacist. The original formula differed slightly from that in the British Pharmacopœia, being as follows :—

Powdered tragacanth	3 dr.
Glycerin	9 fl. dr.
Water	4 fl. dr.

Mix the gum and glycerin till smooth before adding the water.

Mr. Proctor remarked of this : ‘ Four ounces of the dry materials require exactly 1 ounce of this mucilage to form a convenient mass, which retains its plastic condition, its solubility, its retentiveness of shape, and a ready miscibility with other aqueous masses, if that were necessary.’ The glycerin is the best excipient for salts and metallic oxides, such as potassium bromide and bismuth subnitrate. The mass should be well kneaded, or more of the excipient will be used than is really necessary. This may be remedied by the cautious addition of a little glycerin and water to the pill-ingredients.

Water is a vehicle rather than an excipient. It is used along with substances which contain within themselves a binding material, such as gum, or in masses containing soap. As a rule 3 minims of water suffices for a dozen 5-grain pills.

Wax or **Cocoa Butter** is useful to thicken essential oils and the like before kneading them into a mass with powdered althæa. Melt the wax or cocoa butter in a pill-tube by a gentle heat, add the oil, stir, and mass with the powder—1 grain of wax for 2 minims of oil. Cocoa butter is excellent as an excipient for oxidising-substances—*e.g.*, silver oxide.

HINTS BY MR. JOSEPH INCE.

The following remarks by the late Mr. Joseph Ince, formerly Lecturer on Pharmacy at the School of Pharmacy, Bloomsbury, were contributed to the treatise published in 1884 :—

Excipients to be Avoided.—(1) Those incompatible with any of the ingredients of the pill-mass. Thus, confection of roses must not be used to make up iron compounds ; acetic extract of colchicum must not be stiffened with magnesia. (2) Those which make the pills either too hard or too soft. (3) Those which unduly increase size.

Cera Flava will bind any coloured essential oil into a convenient mass ; while **Cera Alba** is used with the colourless oils. Wax has come into disfavour for internal use. It is effectual as an excipient, but not a necessity.

Decoct. Aloes Comp. is invaluable as an excipient for pills containing aloes and gum resins. Wonderfully small quantities are required, and it is not only effective, but a brilliant, glossy appearance is communicated. Where soap is also present still smaller quantities must be employed.

Liquor Potassæ has deservedly gone out of repute. Its convenience is undoubted, but its chemical action is regarded with suspicion. Pills made with it frequently become tough.

Ol. Ricini, with or without soap, forms a good excipient for camphor pills.

Pulv. Tragacanthæ.—In sparing quantities, and employed with discretion, there is no more serviceable excipient. The chief caution is to allow time, for it is surprising how small quantities will prove effective. Take this difficult formula as an illustration :—

Camphoræ	gr. vj.
Pil. galban. comp.	gr. xvij.
Ext. cannabis ind.	gr. iij.
Pulv. tragac.	gr. iij.

M. Fiant pil. vj.

Let the camphor and extract of Indian hemp deliquesce ; add the galbanum pill, previously warmed gently ; when the inevitable action has taken place add 3 grains of powdered tragacanth and beat into a mass.

Water alone may be used as an excipient, as in opium pills, but the use of water needs a very practised hand to make it successful. The mass may be as soft as paste or as hard as flint. ‘In medio tutissimus ibis.’ The real use of water is by partial solution of the ingredients to diminish bulk, after which add the proper excipient. One drop of water or one drop of glycerin will often effect wonders in this way, and pills that otherwise would be of inconvenient size can be most elegantly dispensed.

HINTS BY MR. A. W. GERRARD.

What are the conditions required of a well-made pill? This was a question asked in the original treatise by Mr. A. W. Gerrard, then head dispenser at University College Hospital, London. He answered it as follows :—

(1) The ingredients of which it is composed should be worked into an intimate admixture, no individual particles being discernible.

(2) The parts should be held together by some cohesive

force, sufficient to withstand the process of rolling and cutting without undergoing crumbling or cracking.

(3) The pills being formed should retain under ordinary conditions a perfectly globular form.

(4) The excipient, whether indicated by the prescriber or left to the discretion of the dispenser, should be chemically and therapeutically compatible with the other ingredients.

(5) The pills should disintegrate readily soon after ingestion.

Failure to produce these conditions may be ascribed to a variety of causes—as, for example, excess or deficiency of a moist extract; presence of hygroscopic or deliquescent bodies; chemical incompatibility of ingredients; excess of essential or fixed oils; injudicious choice and use of excipients, or bad manipulation.

The following are some prescriptions illustrating cases of failure, and the means of overcoming it :—

Ext. nucis vom.	.	.	.	.	.	.	gr. ss.
Ext. hyoscy.	.	.	.	.	.	.	gr. iij.
Pulv. ipecac.	.	.	.	.	.	.	gr. ss.

Fiat pilula.

Pills made from these ingredients soon lose their round form, becoming moist and unsightly; the addition of $\frac{1}{2}$ grain of tragacanth powder sets all right, by absorbing moisture and imparting solidity.

Ext. colch. acet.	.	.	.	.	.	.	gr. ss.
Ext. hyoscy.	.	.	.	.	.	.	gr. iij.
Pil. hydrarg.	.	.	.	.	.	.	gr. ij.

Fiat pil. Mane et nocte sumend.

This pill has the same defects as the previous one, but the materials of each pill, $5\frac{1}{2}$ grains, make it too bulky to risk an addition. The difficulty can be got over by drying the extract of henbane on a pill-tile over a water-bath. Bear in mind volatile bodies must not be so treated.

Argenti oxidi	.	.	.	.	.	.	gr. ij.
Pil. rhei co.	.	.	.	.	.	.	gr. iij.

Fiat pil. Sumend. ante cibum.

Of all masses this is one of the most obstinate and vexing, as it becomes rapidly tough and unmanageable, owing to the silver oxide being slowly reduced. A small admixture of confection of hips with the oxide at starting generally gives a good result.

Ol. caryoph.	.	.	.	.	.	.	.	mj.
Ext. col. co.	.	.	.	.	.	.	.	gr. ij.
Ext. anthem.	.	.	.	.	.	.	.	gr. ij.

Fiat pil.

Here essential oil is in excess, and the ingredients refuse to form a tenacious mass. In such a case the addition of $\frac{1}{2}$ grain of soap per pill brings them under control. Soap should not be used for salts of iron, lead, bismuth, copper, or mercury, as oleates would be formed.

Olei crotonis	mj.
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Fiat pilula. Statim sumenda.

For this pill nothing is better than 2 grains of compound tragacanth powder and 1 grain of soap. This excipient subdues croton oil perfectly, and it is equally suitable for creosote and carbolic acid.

Compound tragacanth powder is about the best general pill-excipient. The simplicity of its constituents admirably adapts it as a diluent of all substances given in small doses; whilst under its influence, in the presence of a little water, the most obstinate ingredients are brought under control. Solubility with easy disintegration is another of its characteristics. When oils have to be dealt with, a little soap may be added to the compound tragacanth powder with advantage.

INGREDIENTS OF PILLS AND HOW TO MASS THEM.

FROM what has already been said regarding excipients it will be seen that dexterity in the art of pill-making largely depends upon knowledge of the physical properties of the ingredients and their relations to the excipients. It is the dispenser with one universal excipient who brings pharmacy into disrepute by turning out pills that disgust the customer by the stickiness which comes over them or disappoint the physician through their marble hardness. Mr. Gerrard's remarks in the previous chapter regarding the essentials of a pill are to the point.

General rules are, however, like the general excipient, a failure now and then. Thus it is good to use glycerin of tragacanth as an excipient for water-insoluble chemicals, and this is admirable and true for bismuth subnitrate, cerium oxalate, and many other inorganic chemicals, also for organic compounds such as quinine sulphate ; but the rule breaks down with mixtures of certain powders each of which is sparingly soluble in water—for example, camphor and menthol—which when mixed together liquefy, thus overthrowing the rule as to the excipient.

In this chapter ingredients which behave in an abnormal manner and exceptional combinations of ingredients are treated. The side-titles to the paragraphs are given in Latin when specific articles are dealt with, and in English when groups of a kind are the subject of treatment. Dispensers are advised to add examples from their own experience.

Acetanilidum.—Is sparingly soluble in water. Reduce to fine powder and mass with glycerin of tragacanth.

Acids.—The mineral acids are rarely, if ever, prescribed in pill form in this country, but it sometimes happens that a German prescription of this nature turns up. With the addition of powdered althæa and glycerinated water good plastic masses are obtained, as in the following :—

Pepsini	gram.	2·5
Rad. rhei	„	5·0
Ext. gentianæ	„	1·5
Acid. muriatici	gtt.	20
(Rad. alth., aq. glycerini, aa. 0·5.)		

M. Fiant pilulæ 100.

Send out such pills in a bottle.

The following is a curious English prescription :—

Acid. sulphuric. fort.	gtt.	vj.
Extracti aloes	gr.	xxiv.

M. Fiant pil. xij.

The procedure is : Rub the powdered extract with the acid for a few seconds, and mass with the smallest possible quantity of rectified spirit and syrup (equal parts). The well-known Easton's syrup pill is another good instance of the use of mineral acids as excipient :—

Ferri phosphatis	gr.	xx.
Quininæ sulphatis	gr.	xv.
Strychninæ	gr.	j.
Acid. phosphoric. syrup.	mxxv.	

Fiat massa et divide in pilulas viginti.

Mix the solids thoroughly, add the acid, and beat well. The mass is too soft at first, but soon begins to harden, and should be rolled and cut before too late.

Acidum Arseniosum.—When medicines are given in doses of a fraction of a grain the dispenser has to consider

whether they are very soluble in any inert solvent which will not prevent them being made into a mass, for if they are of this nature it is obviously advantageous to dissolve, add a powder, and a suitable paste excipient to mass. Arsenious acid is not one of those substances, therefore before attempting to mass it it must be well triturated with any powders prescribed along with it. For example, in the familiar Asiatic pill, the arsenious acid is combined with ten times its weight of powdered black pepper, the resulting pill containing $\frac{1}{16}$ grain of the acid. Here we take the prescribed amount of arsenious acid and triturate intimately in the mortar with its own bulk of the pepper, then as much again, and so on until all the pepper is used up, finally massing with glycerin of tragacanth (a better excipient than gum and water). The treatment of more soluble substances is exemplified in Atropine (which *see*).

Acidum Benzoicum.—Five grains makes a fair mass with a drop of glycerin, but theriacanth gives the best results. For a white pill use glucanth.

Acidum Carbolicum.—Phenol is one of the most troublesome things to make into pills that the dispenser meets with, owing to the fact that it tends to or actually does liquefy when rubbed in a mortar with other substances. With some extracts it forms a syrup; with alkaloidal salts, especially sulphates, it liquefies; and its behaviour towards many other organic substances is so precarious that dispensers will do well to reflect upon the table (Dr. E. A. Ruddiman's) printed on the opposite page, which shows that when any two of the substances named are mixed they form—P, a dry powder; L, liquid; DP, damp powder; PM, pasty mass. Alkaloidal salts behave similarly to antipyrin.

Phenol in detached crystals is the most convenient form for the dispensing-counter, especially for making pills. The excipients for it are about half a dozen—viz., wheaten flour, powdered soap and liquorice, soap and tragacanth with glycerin, powdered althæa and a trace of glycerin, kieselguhr

and powdered curd soap, and hard paraffin with wheaten flour. Success with any of these greatly depends upon habit. The modern tendency is to use a dilute mass—1 of acid in 4 or 5—and to make it firm so that the pills will not dissolve quickly. For plain white pills the following are hard to beat :—

I.		II.	
Carbolic acid . . .	3j.	Carbolic acid . . .	3j.
Wheaten flour . . .	3ij.	Hard paraffin . . .	gr. xij.
Powdered tragacanth	3ss.	Wheaten flour . . .	gr. XLV.
Liquid glucose . . .	a sufficiency	Glucanth	gr. iij.
Mass.		Mass.	

The second of these masses is Mr. E. W. Lucas's 50-per-cent.

The excipient to be used must depend greatly upon the nature of the mass. For example :—

Bismuthi subnitrat.	. . . . .	gr. iij.
Acid. carbol.	. . . . .	gr. j.

Fiat pil.

This makes a good pill by rubbing up the acid with half a grain of powdered curd soap, adding the subnitrate, and massing with a very little glycerin of tragacanth. A quarter of a grain of pepsin also makes a good mass.

Podophylli resinæ	gr. $\frac{1}{8}$
Pil. rhei co.	gr. iij.
Acid. carbolic.	ʒj.

Fiat pil. j.

Rub the phenol with an equal weight of soap ; then add the powdered ingredients of the rhubarb pill, the podophyllin, and a little powdered tragacanth. Mass with a little treacle.

Camphoræ	gr. xij.
Phenol. ;	gr. iv.
Pulv. capsici	gr. iv.
Ext. nucis vom.	gr. iv.
Excipient.	q.s.

Divide in pilulas xij.

On mixing the camphor and phenol they liquefy. It is then difficult to combine the extract, therefore mix the three together, and triturate until uniform, add the powdered capsicum and 6 grains of powdered curd soap, mix and mass with kieselguhr. This is substantially the procedure with most of the liquefied phenol combinations, but soap is not

always a desirable addition. Hard paraffin is the best substitute for soap, and next to it compound tragacanth powder.

Acidum Gallicum makes a good mass with a sixth to an eighth of its weight of glycerin.

Acidum Oxalicum.—Powder well and mass with kaolin ointment or cocoa-butter.

Acidum Salicylicum.—Reduce to fine powder and mass with glycerin of tragacanth.

Acidum Tannicum.—If massed with mucilage, the pills dry, crack, and crumble to powder. A mixture of glycerin and mucilage of acacia (or dispensing-syrup) makes an excellent excipient.

Aloes.—Pills containing aloes in any fair proportion, and particularly when in combination with colocynth, scammony and soap, are best made with decoct. aloes comp., which an eminent pharmacist has called their 'natural excipient.' It has great solvent power, and must be used in very sparing quantity. Aloes, mastic, and soap are best massed with this excipient. Decoct. aloes comp. owes its value as an excipient chiefly to the presence of potassium carbonate, which is an active solvent of organic substances, but not in every case a desirable addition to a pill-mass. Aloes alone, or the extract, in pill, is the better for the addition of some fibrous material, such as about a tenth of its weight of althæa or liquorice : mass with spirit. This helps to keep the shape of the pill.

Aloinum.—This active principle is practically aloes free from resin and extractive matters, therefore devoid of the binding-materials which make solvent excipients appropriate for aloes. Glycerin of tragacanth masses aloin well.

Aluminii Chloridum.—A very deliquescent salt, which should be massed with lanoline, cut and varnished expeditiously, *e.g.* :—

I.				II.			
Ferri arsenat.	.	.	gr. $\frac{1}{12}$	Aluminii chloridi	.	.	gr. iv.
Aluminii chloridi	.	.	gr. iij.	Ext. belladonnæ	.	.	gr. $\frac{1}{4}$
Ext. nucis vom.	.	.	gr. $\frac{1}{6}$	Ft. pil.			
Ft. pil.							

In the case of No. I. the nitrate was mixed with 12 grains of French chalk and massed with resin ointment, the rest of the ingredients being mixed and massed with the same excipient, then the two masses were intimately blended. For No. II. the excipient must be what will best suit the logwood extract. This may be 6 drops of proof spirit or 5 drops of glycerin for the dozen pills: either makes a nice mass.

Argenti Oxidum parts with its oxygen rather quickly when brought into contact with some things—*e.g.*, creosote—and when massed with extract of gentian or confection of roses the pills have been known to explode. The best excipient is kaolin ointment. When extract of gentian is prescribed along with the oxide, Mr. Harold Wyatt, jun., recommends that the oxide be massed with resin ointment, the extract stiffened with powdered gentian, and the two masses mixed and divided. It would do, however, to add powdered gentian to the fatty mass in sufficient quantity to soothe the dispenser's conscience without disturbing the pill, for in all likelihood the prescriber of extract of gentian along with silver oxide has not the slight tonic properties of the extract in view, but desires to sport his galenical skill.

Atropinæ Sulphas.—Plain atropine and its sulphate are frequently prescribed in pill, the doses ranging from gr. $\frac{1}{120}$ to gr. $\frac{1}{50}$. The pills are usually made $\frac{1}{2}$ grain to 1 grain in size, and the alkaloid or its salt should be dissolved, the alkaloid in rectified spirit (1 grain dissolves in 4 minims) and the sulphate in water (soluble in its own weight). Triturate well with wheaten flour (or powdered liquorice if a white pill is not particularly desired) in the proportion of $\frac{1}{2}$ grain to each pill, and mass with glycerin of tragacanth. A trituration of the alkaloid, prepared as mentioned on page 81, may be kept ready. This paragraph may be regarded as applicable to other alkaloids of similar potency to atropine when given in pill form.

Balsams, Oils, &c.—Pill-masses are sometimes required with fluid or soft resins, fluid balsams, oils, or fats as in-

redients. When the quantity of these is too large to admit of the formation of a mass by the addition of any reasonable quantity of powder, recourse must be had to wax, in the proportion of one-third up to an equal weight of wax, according to the fluidity of the stuff. The wax, with the medicament, should be melted in a dish or tube by hot water, as the application of a strong heat would be likely to depreciate the medicinal properties of the ingredients through evaporation. In using wax the dispenser must be careful that he does not bring the resulting mass to such a degree of hardness that the pills will not disintegrate in the alimentary canal—the melting-point of the mass should not be above 100° F. An ordinary pill, though much harder than a wax pill, may dissolve in the stomach, because its ingredients are soluble in water.

Balsamum Peruvianum. — The following formula makes a good pill-mass : Balsam of Peru, gr. xxx. ; slaked lime (in fine powder), gr. xv. ; castor oil and rectified spirit, of each 2 drops. This forms a mass which does not become hard, and is of good pilular consistence. It requires to stand for an hour before being rolled out. The following prescription shows a difficulty :—

Ferri reduct.	.	.	.	.	.	.	gr. iij.
Bals. peru.	.	.	.	.	.	.	ʒ ss.
Pulv. amyli	.	.	.	.	.	.	q.s. ut fiat pilula

Mitte xxxvj.

Starch-powder is not the best absorbent in this case, because it is too hard for pill-masses and rather retards than aids the binding of the mass. Liquorice-powder is much better. After rubbing the reduced iron to ensure fineness of division, the balsam and half its weight of black treacle are added and well beaten together. The resulting mass is soft and oily in appearance, but not crumbly, and the addition of liquorice-powder, q.s., gives the required stiffness. The small percentage of alkali in the treacle seems to combine with the resin of the balsam, thus making a good binding excipient.

Beta-naphthol.—Triturate with a fourth of its weight of kaolin before massing with tragacanth. The substance makes a pasty or liquid compound with some things, such as—

Beta-naphtholis	3ss.
Mentholis	gr. vj.

Fiat massa et divide in pilulas xij.

This masses nicely with 3 grains each of powdered acacia and althæa, and 2 grains each of powdered soap and sugar.

Bismuth Salts.—Subcarbonate and subnitrate are readily massed with a fifth of their weight of glycerin of tragacanth. *Cerium Oxalate* is treated similarly.

Butyl-chloral Hydras (Croton Chloral).—In conformity with the rule that white substances should be made into white pills, butyl-chloral hydrate should not be massed with such excipients as confection of hips or extract of gentian, which would give a dark-coloured mass. Equal parts of powdered acacia, tragacanth, and syrup make good pills. Glycerin in any form makes a troublesome buttery mass (a result of solution). A pill containing $2\frac{1}{2}$ grains each of butyl-chloral hydrate and quinine sulphate is a good example of self-exciency. For a dozen mass use 3 drops of rectified spirit, which partly dissolves the butyl-chloral hydrate, making a sticky excipient which binds the quinine sulphate into a white plastic mass that divides well into small 5-grain pills. Butyl-chloral hydrate and exalgin liquefy when rubbed together, and should be treated like similar pills of carbolic acid.

Caffeina.—This alkaloid and its citrate present no difficulty when prescribed alone (glycerin of tragacanth is the excipient), but, the citrate being a feeble salt (the acid is potentially free), strange things happen in combination. For example :—

Ferri sulphatis exsiccata	gr. j.
Caffeinæ citratis	gr. j.
Zinci valerianatis	gr. ij.

Fiat pilula. Mitte talesxxiv.

When this is massed valerianic acid is liberated by citric acid pushing it out from the zinc salt. The best plan is to use instead of caffeine citrate an equivalent amount of the alkaloid—viz., 14 grains—and mass with tragacanth and syrup.

Calcii Chloridum.—Pills of this salt do not silver well unless special precautions are taken. Make a mass with Canada balsam. When rolled out and well rounded, coat the pills with tolu and ether, and after five minutes moisten them very slightly with thin mucilage, applied by the finger and thumb, drop them in the silver leaf, and proceed *secundum artem*. Send the pills out in a well-corked bottle, as they are likely to deliquesce.

Calcii Sulphidum.—Fractions of a grain are given at a time, and the pills are usually less than 1 grain in size. Triturate the sulphide with $\frac{1}{2}$ grain of sugar of milk for each pill, then add $\frac{1}{24}$ grain of powdered tragacanth, and mass with glycerin. This makes an odourless mass; the presence of water in any form, even as in confection of roses or an aqueous extract, decomposes the sulphide with evolution of sulphuretted hydrogen, and the virtue of the pill is thereby more or less destroyed.

Camphor generally gives trouble, and is the rock upon which many candidates for examination are stranded. In the first place powder the camphor finely—it is preferable to use *flowers of camphor*—by the aid of a little spirit; then, if the pill contains camphor simply, mass with glycerin of tragacanth. This also serves well for such a pill as—

Ammonii carbonatis	.	.	.	.	.	gr. iss.
Camphoræ	.	.	.	.	.	gr. ss.

Some dispensers prefer to use an excipient consisting of soap and a little fixed oil for camphor alone, as in the following formulæ :—

Ordinary-size Pills.

Camphoræ	.	.	.	.	.	gr. xvij.
Ol. olivæ	.	.	.	.	.	gtt. iij.
Saponis	.	.	.	.	.	gr. iij.

M. Fiant pil. vj.

Large-size Pills.

Camphoræ	gr. xxiv.	Camphoræ	gr. xviii.
Ol. ricini	gtt. iij.	Pulv. sapon. animal. .	gr. iij.
Saponis	gr. ij.	Pulv. tragacanthæ .	gr. ij.
M. Fiant pil. vj.		Syrupi	q.s.

Fiat massa et divide in pil. vj.

When extract of henbane (or other green extract) is ordered along with camphor, powder the latter with the addition of a little soap instead of spirit. The extract will then make a good plastic mass which retains its consistence for some time. If the extract should make the mass too soft, it may be stiffened with powdered curd soap, or a mixture of the soap with liquorice.

When there is a large proportion of gum resin in the mass, rectified spirit is a good excipient, as in the following :—

Pulv. asafetidæ	℥v.
Pulv. zinci oxidi	gr. xij.
Pulv. camphoræ	gr. vj.
Ext. belladonnæ	gr. iij.

Fiant pil. xxiv.

Another example :—

Ext. belladonnæ	gr. iv.
Pulv. camphoræ	℥ss.
Quininæ sulph. . . .	℥j.
Zinci sulph. . . .	gr. x.

M. Fiat mas. et div. in pil. xxx.

In this case powder the camphor by aid of a drop or two of water and the zinc sulphate, add the quinine and extract, with a few grains of tragacanth, and make a softish mass with a mixture of 2 parts of simple syrup and 1 part of glycerin.

The phenol table (page 97) shows that camphor liquefies with chloral hydrate and other substances. The following prescription gives considerable difficulty :—

Chloral hydratis	℥ss.
Camphoræ	gr. iij.

Fiat massa et divide in pilulas viij.

The resulting mixture absorbs more than double its weight of powdered liquorice. Soap is inadmissible for such a mass, as the trace of alkali in it splits up the chloral hydrate. A good mass was made by adding 16 grains of powdered liquorice, 4 grains of powdered tragacanth, and 2 drops of water. Beaten well, the mass was soft at first, but turned out all right.

Camphora Monobromata.—Reduce the monobromate to fine powder, mix with it pulv. tragac. co. 1 to 7, and mass with glycerin of tragacanth. A pill containing 1 grain each of menthol and the monobromate gave some trouble, as the ingredients liquefied. It made a good mass (twelve pills) with curd-soap powder 8 grains, powdered tragacanth 2 grains, water 1 drop, and kieselguhr to stiffen.

Cinchonidina and other cinchona alkaloids may be treated as quinine (which see).

Codeina.—Alone this presents little difficulty: mix the powdered alkaloid with half its weight of powdered liquorice, and mass with glucanth or glycerin of tragacanth. The following combination is very hygroscopic:—

Codeinæ	gr. xij.
Ext. nucis vomicæ	gr. viij.
Ext. cascar. sagrad.	gr. xij.

Fiat massa et divide in pilulas xij.

The best plan is to work the whole together with 6 grains of compound tragacanth powder and 1 drop of proof spirit (if required), divide, and varnish.

Copaiba was at one time ordered very frequently in pill form, and magnes. carb. levis was the favourite excipient, but the mass so made becomes as hard as stone and is not disintegrated in the alimentary canal. Probably a part of the volatile oil may be assimilated, but this is doubtful. A better plan is to make a gum emulsion of the 'balsam,' and then add 1 part of calcined magnesia to every 10 parts by weight of 'balsam.' In about twelve hours the emulsion should be of the consistence of a thick salve. Now, by the addition of a very

small quantity of borax, a pill-mass is obtained which leaves nothing to be desired. A pill taken in the mouth is at once brought to the condition of an emulsion, and the mass will keep for a long time, only requiring when it is old to be worked up in a warm mortar. Phosphate of calcium is also a good excipient.

Creosoti Carbonas (Creosotal).—This may be treated like creosote. The following is a practical example :—

Creosot. carb.	.	.	.	.	.	gr. iss.
Ac. arseniosi	.	.	.	.	.	gr. $\frac{1}{60}$

Misce. Fiat pil. Mitte xxiv.

Forty-eight pills had to be made out of the twenty-four in order to get them of a reasonable size. The creosotal, 20 grains of wax and 40 grains of curd soap, were placed in a wide-mouthed corked bottle and heated in a water-bath, with occasional shaking, till they combined. When cold, 30 grains of powdered liquorice and 5 grains of powdered tragacanth were added, and the whole well beaten in the mortar.

Creosotum.—The late Mr. W. Martindale said the best material for combining creosote into pills is powdered curd soap. Put the soap and the creosote in equal parts into a wide-mouthed stoppered bottle ; mix well, and digest on a water-bath till they combine. This, on cooling, forms a plastic mass suitable for forming pills, and can be combined with other ingredients, preferably in powder. A few shreds of yellow wax, with a little powdered soap, makes good pills, but the mass is somewhat insoluble unless liquorice is added. Mr. Lucas recommends creosote 50, powdered curd soap 35, and wax 15 to be melted together, and kept in stock for use as required. This mass contains 1 in 2, and gives a good pill with liquorice. Light calcined magnesia (1 grain to 2 minims) solidifies creosote in a few hours, and can then be easily worked into pills ; but the pills thus made are as insoluble as marbles. Always be careful about using such articles as magnesia for pill-massing : in most cases a chemical change is the result. Powdered soap gr. ss. and

powdered liquorice gr. iiss. make a good mass with 1 minim of creosote. Curd soap is better than Castile soap. For example : Creosote $\mathfrak{m}\mathfrak{x}\mathfrak{i}\mathfrak{j}$., curd soap, dried and powdered, gr. vj., phosphate of lime, q.s. This makes a good mass and a small pill, but Castile soap does not. Lycopodium and animal charcoal in equal parts are an excellent absorbent ; so is kieselguhr.

Strychnin. sulph.	.	.	.	.	.	gr. $\frac{1}{30}$
Hyd. perchlor.	.	.	.	.	.	gr. $\frac{1}{30}$
Creosoti	.	.	.	.	.	$\mathfrak{m}\mathfrak{j}$.

Ft. pil. Mitte tales x.

This is a trying prescription. Soap and magnesia are not permissible with hydrarg. perchlor. Thirty grains of flour, 1 grain of tragacanth, and syrup q.s. make an excellent mass. Powdered cinnamon or cassia is a suitable powder in which to roll them. It is absorbent and covers the odour of the creosote.

Crystalline Salts, soluble in water, require a little care. They should be very finely powdered, and massed with glycerin of tragacanth and an inert powder. If to be silvered, they must be varnished with tolu, and allowed to dry, before using mucilage, or else silvered with the varnishing solution alone.

Potass. brom.	.	.	.	.	.	3ss.
Ferri sulph.	.	.	.	.	.	3ss.
Ext. nucis vom.	.	.	.	.	.	gr. iiss.
Ext. gentianæ	.	.	.	.	.	q.s.

Fiant pilulæ xv.

In this instance double decomposition takes place between the two salts, the water of crystallisation in the sulphate of iron being liberated ; consequently a very small quantity of extract suffices to make a mass. As ferrous bromide is formed, the pills should be varnished and sent out in a bottle.

Quininæ sulph.	.	.	.	.	.	gr. xxiv.
Ferri sulph. exsic.	.	.	.	.	.	gr. xxiv.
Ferri arsenatis	.	.	.	.	.	gr. iss.
Ext. nucis vom.	.	.	.	.	.	gr. vj.
Ferri iodidi	.	.	.	.	.	gr. xlviij.

Fiant pilulæ xxiv. Varnish with tolu.

This is likely to prove troublesome. The ferrous iodide (recently prepared) should be powdered in a warm mortar, the other ingredients added, together with 5 grains of glycerin of tragacanth; the whole is to be vigorously worked together until it becomes plastic, rolled quickly, and varnished. Dispense the pills in a bottle. Six or eight grains of extract of gentian also makes a good mass.

Ergotinum.—This is supplied of different consistencies, some samples being quite thick and granular like extract of beef, others smooth and semi-fluid. In either case it requires the addition of an inert vegetable powder, such as powdered althæa or liquorice—our favourite excipient is a mixture of powdered tragacanth 1 part and powdered liquorice 19 parts, this generally sufficing for 20 parts of ergotin. If there be more than 2 grains of the ergotin in each pill, it requires evaporation in order to keep the pill of a reasonable size. The addition of about a twentieth part of tragacanth to each part of ergotin is an improvement. The following are typical combinations prescribed as uterine stimulants :—

I.	II.
Ergotini . . . gr. ij.	Potass. permanganat. . gr. xij.
Ferri redacti . . . gr. ij.	Ergotini . . . gr. xij.
Strychninæ . . . gr. $\frac{1}{32}$	Fiat massa et divide in pilulas
Fiat pilula. Mitte tales LX.	duodecim.
Silver and send out in a bottle.	

Reduced iron, being non-absorbent, rather hinders the massing of No. I. The best result is obtained by triturating the strychnine well with the reduced iron, adding 10 grains of powdered tragacanth, then the ergotin, and sufficient powdered liquorice to mass. No. II. is a wretched incompatible, as the permanganate oxidises the ergotin. Mr. Harold Wyatt, jun., dispensed the prescription by massing the permanganate with resin ointment, dividing into pills which were well rolled in French chalk. The ergotin was massed with althæa, cut, and the pills flattened into discs. Each permanganate pill was then coated with an ergotin disc. This exquisite plan may be adopted as the last resort in the case of other incompatibles.

Essential Oils.—The addition of wax or resin should be the last resort, but this is sometimes unavoidable, as in the following case, where the use of soap is objectionable owing to the double decomposition which would result between the ferrous sulphate and the soap :—

Ferri sulph. exsic.	.	.	.	.	.	gr. $1\frac{1}{5}$
Ext. aloes aq.	.	.	.	.	.	gr. j.
Olei sabinæ	.	.	.	.	.	ʒj.

M. Fiat pil. Mitte cxliv.

Melt 72 grains of yellow wax on a water-bath, and add the oil, gently beating if necessary till they are thoroughly mixed. Mix the aloes and ferrous sulphate with 12 grains of powdered tragacanth. Pour upon this the oil and wax. Mix well, and mass with a little glucose syrup. This makes a beautiful 4-grain pill. Soap is generally all that is required to make a tractable mass, but a mixture of powdered soap 1 part and powdered liquorice-root 5 parts is better. Three grains of this makes a good mass with 1 minim of an essential oil and a little water or rectified spirit. In such a case as the following the liquorice should of course be omitted, seeing that the fibrous vegetable material is already provided :—

Pulv. rhei	.	.	.	.	.	gr. j.
Pulv. zingib.	.	.	.	.	.	gr. j.
Ol. carui	.	.	.	.	.	ʒj.

Misce. Fiat pilula.

Rub up the oil with 1 grain of powdered soap, add the powders, and mass with the smallest possible quantity of treacle.

When the powders in a pill are resinous, as is the case with aloes, ext. coloc. co., and pil. asafetid. co., they should be triturated with the oil for a few minutes, and the remaining ingredients, if any, added ; then, if too hard, use rectified spirit, or, if too soft, a sufficiency of liquorice and soap. Such addition is not required in the following, where the essential oils are really the excipients.

Pil. hydrarg.	gr. iv.	Ext. nucis vom.	gr. $\frac{1}{4}$
Pulv. ext. coloc. co.	gr. vj.	Creosoti	℥j.
Podophyllin.	gr. $\frac{1}{4}$	Asafetidæ	gr. iij.
Olei anthem.	℥j.	Pulv. glycyrrh.	gr. ij.
Fiant pilulæ ij.		Fiat pilula.	
Pulv. pil. aloes et ferri	3j.	Ext. hyoscy.	gr. j.
Pulv. guaiaci res.	3j.	Pulv. pil. coloc. co.	gr. iv.
Ol. sabinæ	℥xv.	Ol. cajuputi	℥j.
Fiant pilulæ xxiv.		Fiat pilula.	

A little solution of potash is often of great service in a mass containing much essential oil. Its use, however, in the majority of cases is to be deprecated.

Extracts.—These are amongst the most commonly prescribed excipients. When they occur as active ingredients in pills, the quantities are frequently much in excess of what would be required to make powders into pills of reasonable size. One part of extract will mass at least 2 parts of a powder, or more if the powder is largely water-soluble, so that if more than 2 grains of an extract is prescribed in one pill it is often necessary to evaporate carefully on a water-bath, and mass with tragacanth and liquorice as in the case of ergotin.

Ext. Cannabis Indicæ.—When prescribed alone this extract makes a good mass with powdered liquorice. If aqueous extracts are present, a troublesome mass frequently results. The addition of 5 or 10 per cent. of powdered tragacanth and sufficient dispensing-syrup answers in many cases.

I.		II.	
Ext. cannabis indicæ	gr. iij.	Zinci valer.	gr. xij.
Quinin. sulphatis	gr. xij.	Ext. cannab. ind.	gr. xij.
Ext. hyoscyami	gr. xij.	Ft. pil. Mitte xij. in arg.	
Ft. massa et div. in pil. xij.			

Although both extracts for No. I. were soft, a crumbly unworkable mass resulted. The addition of 1 drop of a mixture of glycerin and spirit (equal parts) acted like magic and gave a splendid mass. Rectified spirit made a very good mass of No. II.

Ext. Cascaræ Sagradæ.—Stiffen with tragacanth and liquorice, and varnish the pills. Thus made they keep their shape perfectly.

Ext. Lactuæ.—The following prescription gave unexpected trouble to the compounder :—

Hydrarg. subchlor.	.	.	.	.	.	gr. xxiv.
Ext. lactuæ	.	.	.	.	.	ʒj.

Misce et divide in pilulas xxiv.

The pills, although made hard and varnished, were returned soft and adhering to the box ; but when rolled in lycopodium and sent out in a bottle almost filled with lycopodium, they did not become soft, although not in this instance varnished.

Ext. Taraxaci.—This preparation is one of the worst extracts in the Pharmacopœia, because it is generally in a state of incipient fermentation, and merely requires dilution with anything to become quite active, giving strange results, as in the following instance :—

Ext. nucis vom.	.	.	.	.	.	gr. iij.
Ext. tarax.	.	.	.	.	.	gr. xij.
Ext. aloes aq.	.	.	.	.	.	gr. iij.
Ext. hyoscy.	.	.	.	.	.	q.s.

M. Fiant pil. xij. (in arg.).

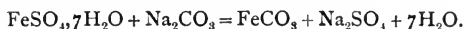
The mass was made with liquorice, and the pills split after being silvered, even though varnished. The swelling was no doubt due to evolution of gas from the extract of taraxacum. It should be noted that some vegetable extracts (gentian, taraxacum, and others) are so acid as to give rise to peculiar and unexpected changes in a mass. Some powdered tragacanth should be used along with a fibrous powder in massing ; the mass should not be made too hard, and the pills should be allowed to stand for half an hour before they are silvered or coated.

Fel Bovinum.—The best excipient is a sufficiency of equal parts of tragacanth and acacia. The ox-gall may be bought in a dried and powdered state. In this condition it is

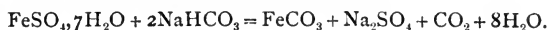
very convenient, and forms an excellent mass with dec. aloes co. conc. Coat with keratin solution.

Ferri Bromidum.—The Société de Pharmacie de Paris recommends a hot strong solution of the bromide to be mixed in a dry warm porcelain mortar with liquorice-powder and gum arabic, in equal parts, sufficient to make a mass. The pills should be rolled in lycopodium or, better, coated with sugar, and preserved in a well-dried bottle.

Ferri Carbonas.—The old-fashioned saccharated carbonate of iron has now been largely displaced through the popularity of Blaud's pills. Five grains of the saccharated carbonate makes a good pill with 1 grain of theriacanth. The original Blaud's pill was made by heating together sulphate of iron and carbonate of potash in honey, then adding other ingredients, and evaporating to a pilular consistence. It is about thirty years since physicians in this country began to prescribe a similar combination of sulphate of iron with an alkaline carbonate or bicarbonate. To the dispenser it mattered much whether carbonate or bicarbonate was ordered. Thus, with sodium carbonate (dried) the reaction is according to the following equation :—



With sodium bicarbonate it is as follows :—



In the latter case the freed carbonic-acid gas greatly affects the resulting mass. Either the salts must be allowed to lie until all the gas is expelled (whereby the ferrous salt is much oxidised by exposure) and then massed, or the mass may be made right off, the consequence being that the pills are much larger than they should be, owing to occluded gas. It is apparent also that, owing to the liberation of water of crystallisation, soft excipients are inapplicable. About 1887 the pill had become so popular that the British Pharmaceutical Conference devised a formula which comprised most of the good points brought

forward by dozens of pharmacists from time to time, and in due course the formula was introduced into the British Pharmacopœia. It was improved in the 1898 and 1914 editions. We append the B.P.C. original and the B.P. 1914 formulæ. The first gives a pill in which ferrous sulphate and potassium carbonate exist as such with some ferrous carbonate; the second provides a pill of ferrous carbonate :—

B.P.C.		B.P.	
Ferrous sulphate	. 60 gr.	Exsiccated ferrous sulphate	
Potassium carbonate	. 36 „	(in powder).	. 33 grm.
Sugar, in powder	. 12 „	Exsiccated sodium carbonate	
Tragacanth, in powder	4 „	(in powder).	. 21 „
Glycerin	. 2½ min.	Tragacanth (in powder)	. 2 „
Distilled water	. a sufficient quantity	Acacia „ „	. 8 „
		Glucose . . .	. 31 „
		Distilled water	. 2 ml.

The B.P.C. directions were : Reduce the sulphate of iron to fine powder, add the sugar and tragacanth, and mix intimately. Finely powder the carbonate of potassium in another mortar, and thoroughly incorporate with it the glycerin. Transfer this to the mortar containing the sulphate of iron, beat thoroughly until the mass becomes green, add water sufficient to impart a soft pilular consistence, and divide into twenty-four pills.

The B.P. directions for making the pill are : Mix the ferrous sulphate with the glucose and water, add the sodium carbonate, mix, set aside for ten minutes to complete the reaction, and mass with the gums.

Ferri Iodidum.—Blancard's iodide-of-iron pills were formerly prescribed to be made as follows : Combine 4 grammes of iodine with 2 grammes of iron filings in 8 grammes of water, filter upon 5 grammes of honey, evaporate to 10 grammes, and make into pills with althæa and liquorice. The method for pil. ferri iodidi, U.S.P., is better, viz.: Reduced iron 4 grammes, iodine 5 grammes, powdered liquorice 4 grammes, powdered sugar 4 grammes, powdered liquorice extract 1 gramme, water 6 c.c. Stir the iron, water, and iodine in a mortar until the red colour disappears ; add the mixed powders.

drive off the moisture on a water-bath, stirring constantly until the mass is of proper consistence, and divide into 100 pills. Coat with toluiated ether. At the dispensing-counter the ready-made ferrous iodide is usually employed, in which case powder it with its own weight of sugar of milk and liquorice, and mass with dispensing-syrup. The following is an exceptional prescription :—

Strychninæ	gr. ss.
Acidi carbolici	3ss.
Ferri iodidi	3iss.
Pulv. digitalis	gr. xv.

Misce et in pilulas triginta dividenda.

First make a mixture of yellow wax 4 parts, powdered curd soap 1 part, and balsam of tolu 1 part, by melting in a water-bath. Mix the carbolic acid with 35 grains of this, and mass with the rest of the ingredients previously mixed together. Roll and cut quickly, and coat with French chalk or gelatin.

Ferri Oxalas.—The ferrous salt is given in doses of 2 to 4 grains in pill. Kaolin ointment makes a good and permanent mass.

Ferri Phosphas.—A good mass is made with glycerin of tragacanth or theriacanth. Phosphoric acid is also used (see page 95). The soluble phosphate (pyrophosphate or citrophosphate) is much used in the United States, as in the following :—

Ferri phosphatis solubilis	3ij.
Calcii phosphatis	3ij.
Ext. nucis vomicæ	gr. v.
Olei eucalypti	℥v.

Fiat massa et divide in pilulas XL.

Mix the oil and extract with the calcium phosphate, add the iron phosphate, and mass with dispensing-syrup. *Lactate* and *Malate* of iron may be massed in the same way as the phosphate.

Ferri Protochloridum.—This is very deliquescent, and may contain a considerable amount of absorbed moisture. It

should be dried carefully on a water-bath, powdered, and massed quickly with a very small quantity of mucilage of acacia; roll in lycopodium, place in a bottle, and nearly fill up with lycopodium. An ordinary coat of varnish is almost useless for a very deliquescent pill: it is much more important to exclude the air which supplies the moisture. An excellent mass which allows leisurely manipulation is made by adding about an eighth of its weight of powdered liquorice-root and sufficient anhydrous wool-fat to mass.

Ferri et Ammonii Citras.—Lanoline is an excellent excipient (see next paragraph), but quite as good a mass is made with 5 grains of soft manna to 15 grains of the citrate, half a grain of powdered tragacanth being triturated with the salt. Proof spirit makes an excellent mass, which has to be finished off quickly. Pills of this salt and the following should be dispensed in a well-corked vial.

Ferri et Quininæ Citras.—Good pills, which keep their shape and do not deliquesce, can be made by using resin ointment as an excipient. Even better are lanoline 3 parts and water 1 part for 30 parts of the citrate. Mix the citrate with the lanoline first. Proof and rectified spirits make a good mass, but in both cases the mass must be rolled out quickly. Avoid glycerin.

Ferri Sulphas.—The granulated sulphate is preferable to powdered crystals for making into pills; it is generally free from adhering moisture, can be readily reduced to impalpable powder and massed with glycerin of tragacanth with the addition of a little powdered sugar. When 5 grains of the sulphate is prescribed for one pill it is necessary to use the dried salt, of which 3 grains equals 5 grains of the undried. One peculiarity of the dried sulphate when massed is that the pills are apt to crack. Liquid glucose is a perfect excipient for the dried salt; 36 grains requires about 12 grains of the liquid.

Quin. sulph.	.	.	.	.	.	.	gr. xv.
Ext. bellad.	.	.	.	.	.	.	gr. x.
Ferri sulph. exsic.	.	.	.	.	.	.	3j.

Fiant pil. xxx.

This was made into a mass with 4 grains of tragacanth and a little glycerin, but after about three weeks the pills cracked. A mixture of glycerin (1 part) and water (2 parts) makes a much better mass in this case, especially if a few grains of powdered acacia is used along with the tragacanth, and triturated with the iron salt before the other ingredients are added.

A favourite pill of the late Sir Andrew Clark's was :—

Aloin.	.	.	.	.	.	.	gr. ss.
Myrrh.	.	.	.	.	.	.	gr. ss.
Ext. nucis vomicæ	.	.	.	.	.	.	gr. ss.
Ferri sulphatis	.	.	.	.	.	.	gr. ss.
Saponis.	.	.	.	.	.	.	gr. ss.

Fiat pilula.

If an aqueous excipient be introduced the soap and sulphate of iron react, forming oleate of iron, and producing a very crumbly mass ; but if massed with a drop or so of glycerin and spirit a capital pill results.

Ferrum Redactum.—A gritty, intractable substance. It should be rubbed down to fine powder, a little powdered liquorice added, and a mass made with glycerin of tragacanth or liquid glucose. Extracts should as far as possible be avoided, as they may be sufficiently acid (although they should not be) to react with the iron and develop hydrogen, thus causing the pills to swell. The following was quite intractable to the first dispenser :—

Ferri redacti	.	.	.	.	.	.	gr. ij.
Ext. nucis vomicæ	.	.	.	.	.	.	gr. ss.
Ext. hyoscyami	.	.	.	.	.	.	gr. j.
Olei carui	.	.	.	.	.	.	gtt. ¼

Fiat pilula.

If dried extracts are used, glycerin of tragacanth makes a fair pill, but a better one is produced by drying the extract of henbane, mixing the oil with the iron, adding the extracts and a third of a grain of lanoline, and massing.

Gingerinum.—This oleo-resin of ginger may be treated like an essential oil, curd soap and althæa making a good mass. It is less troublesome than essential oils, but in such a combination as the following it is worse :—

Pulv. rhei	gr. j.
Thymol.	gr. ss.
Gingerin.	gr. ss.
Ext. nucis vomicæ	gr. ss.
Ext. lactucæ	gr. ss.

Fiat pilula. Mitte xxiv.

Here the gingerin liquefies the thymol. A fair pill is obtained by mixing the gingerin and extracts, separately mixing the rhubarb and thymol, adding to the extracts, and beating with a sufficiency of powdered althæa. [NOTE.—‘Gingerinum’ is dog-Latin; *zingiberis oleo-resina* is the proper name of the preparation.]

Guaiacolum.—This is the principal constituent of creosote, and is obtainable as liquid or crystals. It should be treated exactly like creosote.

Hydrargyri Iodidum Rubrum.—Triturate each dose with half a grain of milk sugar and mass with glucose.

Hydrargyri Iodidum Viride.—Mass with half its weight of manna, which gives an excellent pill that does not oxidise.

Hydrargyri Perchloridum.—This should first be rubbed to a fine powder along with twice or three times its weight of sugar of milk, and the other ingredients, except the excipient, added little by little, so that a perfect mixture may be produced. The following form is designed to exhibit the perchloride in a dissolved state :—

Hydrarg. perchlor.	.	.	.	.	.	gr. j.
Glycerin.	.	.	.	.	.	mj.
Conf. rosæ canin.	.	.	.	.	.	gr. v.
Pulv. acaciæ	.	.	.	.	.	gr. x.

M. Ft. pil. viij.

The perchloride being dissolved in the glycerin, perfect distribution is effected. If the perchloride is dissolved in ether and the solution triturated with liquorice powder, the salt is obtained in a very finely divided state, and the powder masses well with glycerin of tragacanth.

Hydrargyri Subchloridum.—A very good mass is made with manna or glucose, according to the quantity in the pill.

Hydrargyri Tannas.—Treat like calomel.

Hydrargyrum c̄ Cretâ must not be vigorously worked in the pill-mortar, else mercury separates. It masses well with glycerin of tragacanth. If prescribed with powders or pill-masses which can be used in powder, hyd. c̄ cretâ should be carefully triturated with such ingredients first.

Hydrastina.—This alkaloid and its hydrochloride mass well with glucanth.

Ichthyolum.—Ordinary ichthyol makes a bad pill. When more than 2 grains is ordered in one pill the method recommended in the New Remedies chapter should be adopted.

Insoluble Chemicals.—For substances insoluble, or nearly so, in water, and entirely devoid of adhesive property, such as subsalts of bismuth, cerium oxalate, iodoform, &c., glycerin of tragacanth is the best excipient. In some cases a mixture of equal parts of acacia and tragacanth with syrup gives more adhesiveness and excellent results.

Iodum.—Rarely prescribed by itself in pill, but we have met with the following :—

Iodi	gr. ss.
------	---	---	---	---	---	---	---------

Fiant pilulæ sex.

The iodine was triturated in a mortar with a few drops of rectified spirit, 3 grains of kaolin added, and a mass made with

kaolin ointment. Pills so made keep better than if glycerin of tragacanth is used as an excipient.

Iridinum.—This and other resinoids mass easily with glycerin of tragacanth or dispensing-syrup. The following gave difficulty owing to the essential oil reacting in some way with the iridin :—

Iridini	gr. xij.
Olei caryophylli	gtt. iij.
Ext. hyoscyami	gr. vj.

Misce, fiat massa et divide in pilulas sex.

Mix the oil with 6 grains of powdered soap and add the other ingredients ; mass smartly.

Lithium Salts mass well with dispensing-syrup.

Lupulin and Camphor are not readily made into a plastic mass by the usual excipients without considerably increasing the size of the pills, but ether very sparingly used yields a good mass without any other addition.

Mangesii Sulphas.—Mass with glucanth.

Menthol.—This behaves like carbolic acid ; thus :—

Menthol.	gr. j.
Thymol.	gr. j.
Ext. belladonnæ	gr. ss.
Pulv. saponis	gr. ij.

Fiat pilula. Mitte tales xxiv.

The first two ingredients liquefy, and an absorbent is required (kieselguhr) with $\frac{1}{2}$ grain of soap to each pill.

Moschus.—Squire gives ‘Musk 12, powdered acacia 3, powdered liquorice 3 : mix.’

Naphthalinum.—Triturate with its own weight of sugar of milk, and mass with glycerin of tragacanth.

Niccoli Bromidum.—Add a fourth of its weight of althæa or liquorice, and mass with glucanth or extract of gentian.

Oleum Crotonis.—Powdered curd soap, with a little glycerin of tragacanth, does well for croton oil. When a

dispenser gets a prescription such as the following to compound, the best plan is to add 2 grains of wheaten flour to each minim of oil, and mass with the confection :—

Ol. croton.	.	.	.	.	.	.	gtt. v.
Conf. rosæ	.	.	.	.	.	.	q.s.

Ft. pil. iv.

The dispenser who got this prescription melted 5 grains of yellow wax in a mortar and added the oil ; mixed and added 2 grains of confection, then massed with liquorice. It made a fair mass. But, from what has already been said about wax, such procedure may result in a pill which will pass through the body unchanged.

Pepsinum.—Scale pepsin is not so suitable for pills as the partly insoluble powder. Make a rather soft mass with a mixture of equal parts of glycerin, syrup, and water, and roll quickly. Five grains of pepsin and acid. hydrochlor. dil. $\mathfrak{m}\mathfrak{j}$. make a very good mass. Some combinations give trouble, e.g. :—

I.		II.
Pepsin. porci (Bullock)	. gr. iij.	Pepsin. gr. xxxvj.
Acid. carbolic.	. . . gr. j.	Ext. aloes . . . gr. xvij.
Quininæ sulphat.	. . . gr. ss.	Fiat massa et divide in pilulas
Fiat pilula.		duodecim.

No. I. needs no excipient, as the quinine sulphate and carbolic acid liquefy and mass the pepsin. Mix the sulphate and pepsin in the mortar, add the carbolic acid, mass, and roll quickly. To No. II. add 3 grains of powdered tragacanth and mass with glycerin and water (equal parts). *Pancreatin* masses well with glucose syrup.

Phosphorus.—When this is ordered in prescription the simplest method is to dissolve the phosphorus in carbon bisulphide and pour upon a suitable powder, as in the following :—

Phosphori	.	.	.	.	.	gr. ij.
Carbon. bisulph.	.	.	.	.	.	$\mathfrak{m}\mathfrak{x}$. vel q.s.

Solve et adde—

Pulv. saponis dur.	. . . . .	gr. xxxv.
Pulv. guaiaci resin.	. . . . .	gr. xxxv.
Glycerin.	. . . . .	gtt. xij.
Pulv. rad. glycyrrh.	. . . . .	gr. xij. vel q.s.

Ut fiat massa gr. c. To be divided into pills of the strength required, and varnished or coated in the ordinary way.

This mass is of good consistence, easily manipulated, and readily soluble. A drop of oil of cloves added to the carbon bisulphide lessens its tendency to inflame. This method is the most expeditious for the dispensing-counter. Another good plan is to rub up some liquorice powder ($\frac{1}{2}$ to 1 grain for each pill) with half its weight of water, pour on it the bisulphide solution, stir well and without pressure, and make into a mass with compound tragacanth powder. The water effectually prevents oxidation of the phosphorus, and the bisulphide is dissipated in massing. The method also serves for the following :—

Quininæ sulphatis	. . . . .	gr. $\frac{1}{2}$
Ext. nucis vom.	. . . . .	gr. $\frac{1}{4}$
Phosphori	. . . . .	gr. $\frac{1}{33}$

If one has to make, say, 33 pills, rub the quinine and extract together with 15 grains of powdered liquorice and 5 drops of water. Now dissolve the phosphorus in 5 or 6 drops of bisulphide of carbon in a small test-tube ; mix with the other ingredients, and mass quickly with glycerin of tragacanth. The British Pharmacopœia phosphorus pill-mass is fatty, because it is considered that fat preserves the phosphorus from oxidation. The mass is made by dissolving 1 gramme of phosphorus and 20 grammes of theobroma oil in 20 c.c. of carbon bisulphide, evaporating off the bisulphide, then adding 20 grammes of theobroma oil, 11 grammes of wool-fat, 16 grammes of kaolin, and 32 grammes of sodium sulphate. This is an improvement on the 1898 form, disintegration in the stomach being ensured by the kaolin and sodium sulphate. Each grain of the mass contains $\frac{1}{100}$ grain of phosphorus. Phosphorus pills should always be varnished or coated with a solution of wax in ether (1 in 16), and finished off with French chalk.

Pil. Coloc. Co. as now made with resin of scammony invariably flattens. This is prevented to some extent by adding from 10 to 20 drops of potash solution or aromatic spirit of ammonia to the ounce of mass, or by substituting soap for the sulphate of potash. The addition of a fibrous powder such as liquorice gives durability to the mass. An excellent mass is made by adding 10 grains of powdered tragacanth to 180 grains of the species and massing with 15 minims of water. Pills made in this manner take a fine polish and retain their shape well.

Pil. Hydrargyri.—When this is prescribed with a soft extract the latter should, if possible, be dried or used in powder.

Pil. Hydrarg. Subchlor. Co., B.P. 1898, with pill-masses having an aqueous excipient, invariably formed a crumbly combination. The B.P. 1914 has remedied this by omitting the castor oil and replacing it with glucose syrup, with a little acacia and tragacanth, as suggested by Sir James Sawyer, M.D.

Pix Liquida.—Add a little wax (1 to 5), heat, and mass with wheaten flour or any fibrous powder.

Plumbi Acetas.—Mass with glucose and a little compound tragacanth powder.

Potassii Acetas.—A good mass is formed by acetate of potash 18 parts, boro-tartrate of potash 3 parts, and water 1 part. Keep in well-corked bottles.

Potassii Bichromas.—Treat like permanganate (p. 124).

Potassii Iodidum.—Rub the salt in a mortar with a few drops of water into a stiff smooth paste, and mass with a little liquorice powder ; in this way 6 grains may be easily got into a fair-sized pill. Tragacanth and water alone make a good mass. A pill containing this iodide and a considerable quantity of extract of colchicum was ordered, and although carefully dried extract was used, the mass proved to be too soft. As the pills were not required till next day, they were placed under a bell jar (a mortar upside down) with sulphuric acid. This proved a success, and has often been found useful with an otherwise refractory pill.

Potassii Permanganas.—Some years ago the proposal to administer this highly oxidising compound in pill form for certain female complaints brought out a number of suggestions as to the manner in which the permanganate should be made into pill. Obviously no substance which is readily oxidised, such as extract of gentian or glycerin of tragacanth amongst common pill-excipients, should be used. The excipient must be a substance which is practically unoxidisable, and such we have in various fats and earths. For example, resin ointment 1 part and permanganate of potash 4 parts make a good mass, but if kept for some time it disintegrates with great difficulty. Mr. Martindale at first used vaseline, then a mixture of vaseline and hard paraffin, but the mass lacked firmness; then he added kaolin, which gave the desired firmness, and from this was evolved *kaolin ointment*, now a regular stock excipient. Mr. Martindale recommended the pills to be coated with sandarac varnish, but this is questionable advice, for the alcohol penetrates the pill, and is oxidised by a portion of the permanganate. It is better to give the pills a thin coating with a solution of white wax or hard paraffin in benzene, afterwards finishing off with French chalk.

The following prescriptions have to be treated on the principles laid down in the foregoing :—

I.	II.
Ferri mangan. . . . ʒj.	Potass. permang. . . gr. j.
Ferri oxid. . . . ʒj.	Ext. nucis vom. . . gr. ¼
Cinchonin. mur. . . ʒiss.	Fiat pilula. Mitte xxiv.
Ft. pil. 48. Silver.	

For No. I. make a mixture of hard paraffin and vaseline, of each $\frac{1}{2}$ drachm, and to this add the cinchonine previously rubbed down fine, then add the manganate and oxide of iron, both in fine powder, and stiffen with a little kaolin if necessary. In the case of No. II. rub the extract with 12 grains of fullers' earth, and the permanganate with 6 grains and the same of vaseline; mix the two, and mass with resin ointment.

Quininæ Sulphas.—The simplest excipient is glycerin of tragacanth, or 5 per cent. of tragacanth well mixed forms a very good mass with simple syrup; a *little* glycerin may be added if the pills are to be kept long. The use of extract of gentian or other dark-coloured excipients is objectionable, as it is now universally recognised that white substances should be formed into white pill-masses. For this reason *strong* sulphuric acid alone has been much used as an excipient, 1 drop being sufficient for 4 grains of quinine; mass quickly and roll in French chalk or finely sifted arrowroot.

An excellent mass is made with tartaric acid and a little glycerin and water. For a dozen 5-grain pills take 6 grains of tartaric acid and rub it up with the quinine until it becomes crumbly, then add 2 drops each of glycerin and water, and mass quickly. Some object to tartaric acid because it alters the chemical constitution of the quinine salt, sulphotartrate being formed, but this is therapeutically the same as the sulphate.

The dispenser must use his judgment as to what may be the best excipient in unusual cases. Take, for example, such a prescription as the following:—

Quin. sulph.	.	.	.	.	.	gr. iss.
Picis liquid.	.	.	.	.	.	gr. iij.

M. Ft. pil. j. sec. art. Mitte xx., j. ter die.

In this case an inert powder, such as lycopodium or liquorice, adds too greatly to the bulk of the pill. If melted with a fifth of its weight of wax, the tar becomes more tractable, and masses well with calcium phosphate.

Resinous Ingredients in Pills.—Gum resins and resins must be first rubbed to a fine powder, and, to prevent them sticking to the mortar, the latter and the pestle may be first rubbed with paper soaked in almond oil. The resinous powder is easily made into a mass with a few drops of spirit, but the pills so made do not keep their shape. To most of such substances, aloes especially, the addition of a little vegetable powder or scraped blotting-paper is advisable. Asafetida

yields pills of good consistence with a few drops of weak spirit ; but such an addition with aloes produces pills which flatten. Spirit should be added very cautiously, as it is often found, especially when any soap is present, that on working the mass becomes softer than it at first appears. Mucilage of acacia is a much safer excipient than spirit.

If spirit is used the main thing to be observed is not to add too much of it. The mass, for example, should never be made so soft as those massed with ordinary excipients, but should, on the contrary, be so hard as to roll only with some degree of pressure. If this be attended to the pills will not fall. Where, however, they require to be kept for a length of time, some less drying excipient should be used. In all cases where pills are composed mainly of resins, too much friction with the rounder in finishing them should be avoided. We have had occasion frequently to observe the peculiar effect which sharp friction (probably from the heat developed) produces on various resinous substances in the way of changing their physical properties, and in many instances the cause of pills falling is due as much to the friction used in rounding them with the finisher as to the excipient employed.

It is convenient to treat here a few examples of pills containing terebinthinous ingredients. The first is Clay's Chian turpentine pills, at one time considered a cancer specific :—

Terebinthinæ chiæ	. . . . .	ʒiss.
Sulphuris sublimati	. . . . .	ʒj.

Mass in a warm mortar, and divide into thirty pills.

This goes all right, but the addition of 15 grains of lycopodium is an improvement.

I.				II.			
Pulv. resinæ	.	.	ʒiij.	Cupric sulphate	.	.	$\frac{1}{2}$ gr.
Pulv. acaciæ	.	.	ʒj.	Cayenne pepper	.	.	1 gr.
Spt. tenuior.	.	.	ʒiij.	Hydrastin	.	.	$\frac{1}{2}$ gr.
Fiat massa, et divide in pilulas.				Oil of copaiba	.	.	3 m
A non-falling turpentine pill.				Venice turpentine	} of each a sufficiency		
				Calcined magnesia			
				Make a pill. Send 144.			

No. II. is a peculiar prescription. The best plan is to mix all the ingredients with 80 grains of calcined magnesia and 10 grains of Venice turpentine, and allow to stand for twelve hours, or even longer, when the mass becomes hard enough to mould into pills. The presence of much Venice turpentine keeps the mass soft, and the pills fall considerably.

Rhei Pulvis.—Use proof spirit or tincture of rhubarb (mj. to 3 gr.); a *soft* mass should be made and rolled quickly, otherwise it is troublesome. Only twenty-four pills should be made at once, or the mass assumes a leathery condition, and has to be thrown away.

I.	II.
Pulv. rhei . . . gr. xxiv.	Pulv. rhei . . . 3j.
Tr. zingib. fort. . . q.s.	Pulv. saponis . . . 3j.
Fiat massa et div. in pil. vj.	Pulv. ipecac. . . gr. vj.
Use 6 drops of tincture and 2 drops of water.	Fiant pilulæ xxiv.
	This makes a good mass with tr. rhei co. mxxv.

Rhubarb is, like many other substances, one for which each dispenser has his own excipient, as may be judged from the following recommendations by skilled pharmacists :—

(1) Simple syrup is better than either spirit or water for massing powdered rhubarb.

(2) Use a mixture of equal parts of glycerin and tincture of rhubarb (mj. to 3 gr.).

(3) For powdered rhubarb, a mixture of glycerin 2 parts, rectified spirit 1 part, answers well.

(4) Powdered rhubarb makes a good mass with one-fifth its weight of glycerin.

(5) Treacle is the most valuable excipient for powdered rhubarb.

(6) One of the best excipients is glycerin and rectified spirit, equal parts.

For the following pills glucose syrup gives a mass which does not crumble in rolling :—

Sodii carb. exsic.	gr. xvj.
Pulv. zingib.	gr. xx.
Pulv. rhei	ʒiv.
Pulv. sapo.	ʒvj.
Ol. junip.	℥ 160

Ft. massa. Div. in pil. gr. iv.

With watery excipients there is much worry in this case.

Salol.—Masses well with glucanth, but the excipient must be adapted to the combination, *e.g.* :—

I.	II.
Salol. ʒj.	Salol. gr. iiss.
Pancreatin. ʒj.	Acid. carbol. gr. j.
Capsicin. ℥xv.	Ext. nucis vom. gr. ss.
M. Ft. pil. xx.	Ext. opii gr. ss.
	Fiat pil. Mitte xxiv.

No. I. masses nicely with mucilage of acacia and a little rectified spirit, the latter being required to keep down the size of the pill. For No. II. melt 20 grains of Roe's excipient and add the phenol and salol, pour on the extracts previously thinned with a little glycerin and water, and mix quickly; allow to stand for some time, and stiffen with liquorice and tragacanth.

Sodii Arsenas.—Triturate with milk sugar and mass with glucose syrup.

Sodii Bicarbonas.—Three grains of dry bicarbonate of sodium with 1 grain of powdered ginger can be made into a very workable mass by the addition of 1 grain of tragacanth and water or mucilage sufficient to make a mass. The pills both roll well and keep well.

Sodii Nitris.—Occasionally ordered in pill. Care should be taken not to use any acid excipient, else nitrous fumes will

be liberated ; even extract of gentian has done this, the pills swelling and cracking. Kaolin ointment is the best excipient.

Sodii Sulphidum.—Treat exactly like calcium sulphide, but in such a case as the following resin ointment is the best excipient :—

Sodii sulphidi	.	.	.	.	.	gr. xxiv.
Acidi salicylici	.	.	.	.	.	gr. xxiv.
Pulv. capsici	.	.	.	.	.	gr. xij.
Pulv. ipecacuanhæ	.	.	.	.	.	gr. vj.
Ext. aloes	.	.	.	.	.	gr. xij.
Ext. gentianæ	.	.	.	.	.	q.s.

Omit the extract of gentian, as any moisture will make the salicylic acid react with the sulphide, liberating sulphuretted hydrogen ; hence the use of a fatty excipient.

Sodii Taurocholas.—This substance is so deliquescent that it may be massed by simply beating in a mortar with the smallest possible quantity of proof spirit. The pills are coated with melted salol or keratin solution.

Strychnina.—Triturate well with sugar of milk before massing.

Sulphonal.—Masses well with glycerin of tragacanth, but pills are the worst possible form for administering this hypnotic.

Sulphur.—Rarely prescribed in pill form. The following is a good test of dispensing skill :—

Sulphuris præcipitati	.	.	.	.	gr. j.
Hydrargyri subchloridi	.	.	.	.	gr. j.
Cretæ præparatæ	.	.	.	.	gr. ij.

Ft. pil. Mitte sex.

Gum acacia must be avoided, and the sulphur and chalk should be quite dry. Triturate the sulphur lightly with the calomel, add the chalk stir, and mass with glycerin of tragacanth.

Thymol.—May be treated like menthol.

Zinci Oxidum.—Makes a good mass with dispensing-syrup.

Zinci Phosphidum.—Triturate well with sugar of milk ($\frac{1}{2}$ grain for each pill) and mass with glycerin of tragacanth.

Zinci Valerianas.—Add a small quantity of acacia, and mass with spirit. This gives a mass requiring quick manipulation, but yielding excellent results. Glycerin of tragacanth also makes a good mass with the addition of a little inert vegetable powder. For behaviour of the valerianate with caffeine citrate, see page 103.

I.			II.		
Zinci valerianatis	.	gr. iij.	Zinci valerianatis	.	3j.
Creosoti (Morson)	.	mj.	Extracti aloes	.	gr. xxiv.
Fiat pilula.			Ferri arsenatis	.	gr. iv.
			Ext. cannabis ind.	.	gr. ij.
			Fiant pilulæ		xxiv.

No. I. is softish on mixing, but gets firmer on standing, and only requires kieselguhr to mass it. No. II. makes a nice mass with proof spirit.

By intelligent application of the principles involved in the foregoing paragraphs dispensers should be able to overcome difficulties in connection with allied substances.

FINISHING AND COATING PILLS.

THE massing of the ingredients constitutes the more important part of pill-making, and the rest reflects the dispenser's manipulative dexterity. The work of rolling, cutting, and rounding is not arduous, and it is unnecessary to describe these operations in detail, for deftness in respect to them can only be acquired by practice ; but a few hints to students of pharmacy will not be out of place.

A pill-mass is not finished until it is perfectly uniform in appearance. The best mass is one which comes out of the mortar leaving little on the mortar and pestle.

Weigh the mass as soon as it is ready for rolling. This is a good check, and is necessary when the mass is to be divided into more than the number of pills which the machine cuts at a time.

See that the bed of the pill-machine, the roller, and cutters are free from adhering pill-mass, which is detrimental to a good finish.

In rolling, reverse the pipe two or three times, so that the left side may not be thicker or thinner than the right side. (Few people have a left arm as powerful as the right, hence greater pressure is exerted with the latter.)

The pipe should be exactly of the length to cover the number of grooves required. The ends should not be within the last cutting edges but slightly upon them.

Avoid French chalk alone in rolling, and use as little powder as possible. (A pepper-caster is best for sprinkling.)

The cutters should be free from jagged edges and not blunt. The finish greatly depends upon this condition.

Try to round the pills as much as possible during the cutting process by using the cutter gently and at moderate speed.

Check the result by putting the two pills from the ends of the lot on one scale-pan, and the two from the centre on the other scale-pan. See how they balance. Also count the pills.

In finishing with the rounder, press gently and turn as if making the figure 8, but do not reverse the turning.

Pills containing much resinous matter should not be subjected to great friction. Pills otherwise perfect sometimes acquire their falling faculty in the rounding process, owing to friction working changes.

The lid of a chip box furnishes a fair makeshift pill-rounder.

Use the minimum of sprinkling-powder. An excess, especially of fluffy vegetable powder, may provide the patient with a distressing insufflation as well as a pill.

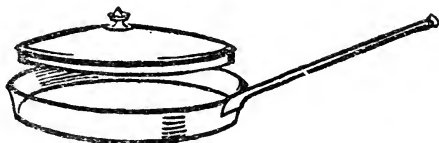
Never silver pills unless so ordered, but varnish as often as permissible and possible. Pills containing deliquescent substances should invariably be varnished.

VARNISHING PILLS.

The pills should be thoroughly well rounded and free from powder. Ensure the latter by shaking them on a muslin sieve (page 168). Place in a covered pot a few drops of the varnish, sufficient to wet all the pills, drop the pills in, and rotate the pot so as to cover all the pills equally. The pills are then transferred to an earthenware developing-dish, so that they may be detached from each other, and occasionally turned until the coating is quite hard.

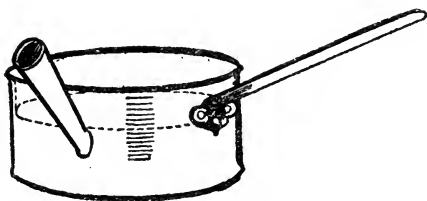
To give the varnished pills a bright polish, they may be transferred from the covered pot to a brass pill-finisher, such as the one devised by Mr. F. W. Goodess, of Leicester (*The Chemist and Druggist*, 1894, II. 640). This is a warming-pan 6 inches in diameter and 2 inches deep, with a spout, and fitted with hinged lid and handle. It should be made of

copper, tin-lined. Immediately on transferring the wet varnished pills to the finisher, the latter is rotated quickly over a Bunsen or spirit-lamp flame (the heat being adapted to the kind of



THE GOODESS PILL-FINISHER.

pill), and in a minute or so the pills dry with a bright polish. A good and cheap drier for pills is made by soldering a shallow porcelain evaporating-dish into a small tin pan with side tube for pouring in water and letting off steam, and provided with



WATER-BATH PILL-DRIER.

a handle. Water is put in the pan, and brought to the boil, while the mass is being rolled and made, and the varnished pills are transferred to the dish and gently shaken to dispel solvent. The following are the best varnishes :—

I.			
Tolu-syrup residues	.	.	℥j.
Ether (meth.)	.	.	℥iij.

Dissolve and filter or decant after standing.

II.			
Balsam of tolu (old)	.	.	℥ss.
Gum sandarac	.	.	℥v.
Ether	.	.	℥vj.

Dissolve and filter.

[Tr. tolu. ℥ij. may take the place of the balsam, in this case reducing the ether to half.]

III. JOHN BELL & CO.'S FORMULA.

Sandarac ʒivss.
 Methylated chloroform . . ʒivss.
 Methylated ether (0·717) . ʒix.

Dissolve.

IV. SQUIRE & SONS' FORMULA.

Sandarac ʒiij.
 Absolute alcohol ʒvj.
 Ether ʒiij.

Dissolve.

V.

Sandarac ʒj.
 Alcohol (90-per-cent.) . . ʒij.
 Dissolve.

VI.

Mastic 5 parts
 Balsam of tolu 15 parts
 Absolute alcohol 25 parts
 Ether 80 parts

All by weight. Dissolve.

The varnishes containing ether are the quickest driers. Martindale's varnish is like No. V., but has absolute alcohol 1 ounce by weight.

GILDING AND SILVERING.

Covering pills with gold or silver leaf is a process which need not be described at great length. Silvering has largely gone out of fashion, and gilding is a refinement of pharmacy which the chemist is rarely called upon to perform. Like all pills which are to be coated, those that are to be silvered should be of firm consistence, and all powder should be carefully removed from them after rolling and cutting.



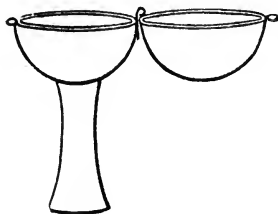
Pills in which there is asafetida, or any ingredient containing sulphur or sulphides, should be stiff, and must be varnished before they are silvered, otherwise the metal will blacken after a few days. A covered pot may be used to silver the pills, or even a 2-ounce chip box, but the boxwood silverer represented in the above cut is generally employed. The form of silverer with a foot to it is handier. Many experienced dispensers prefer the covered-pot arrangement, and use two pots—one for silvering,

the other for polishing or for applying thin mucilage before silvering.

If the pills have been varnished with tolu or other varnish, the surface should not be allowed to dry hard before the silver is applied. In these cases use an alcoholic varnish, which dries more slowly than ether. One drop of weak mucilage is sufficient to damp a dozen 5-grain pills. Put it in a pot and spread out, drop in the pills, and rotate until all are smeared. Note that the pills should have a dull, not a glistening, appearance when they are ready for silvering. The wetter the pills are, the more silver leaf is required, and the finish is not so good. A single leaf of silver coats half-a-dozen 5-grain pills. Put a leaf in the coater, drop in six pills, another leaf, more pills, and so on. Cover and rotate briskly. To give them a bright polish transfer to the 'Goodess' finisher and rotate over Bunsen flame. Gold leaf is used in the same way.

PEARL-COATING.

This is the method of coating pills which is done by making the pill-powder, French chalk, adhere to form a cemented layer on the surface of the pills. Full particulars were given in the 'Art of Pharmacy' ('The Chemist and Druggist Diary, 1898') in regard to coating pills on the large scale. A similar process is used at the dispensing-counter. The apparatus employed is a tin globe copper-lined, about $5\frac{1}{2}$ inches diameter, intersected



in the middle, the two sections being fixed with two brass pins. This arrangement permits of the apparatus being easily taken to pieces and thoroughly cleansed. In practice, two globes are generally sufficient (one is figured above)—namely, one to coat and one to burnish the pills; but if a very high finish is

required, a third is necessary to polish the pills. This is done by thinly coating the warmed globe with hard paraffin. The pills, after passing the second globe, are transferred to the waxed globe, and slowly rotated for a time in it. This gives them a brighter, more uniform, and probably, also, a more permanent coating. Many dispensers succeed in coating pills by using covered pots or tins as coaters.

The coating solutions which are recommended vary in composition, but a good one is made by mixing 1 drachm mucilage of acacia, 1 drachm simple syrup, and sufficient water to make 1 ounce. Of this mixture pour sufficient upon the pills to damp the surface thoroughly—the exact quantity can only be determined by experience, but a dozen 5-grain pills require not more than 2 drops—and after rotating in the coater in order to distribute the gum-mixture uniformly over the surface, transfer to the French-chalk tin, and rotate uniformly until all the chalk has been taken up or the pills are thoroughly coated. If too little chalk has been used, or too much mucilage, more chalk has to be added from time to time until the coating is uniform.

The following are other formulæ for moistening-solutions :—

I.	II.
Acacia mucilage . . . ʒj.	Powdered tragacanth . . ʒss.
Tragacanth mucilage . . ʒj.	Rectified spirit . . ʒss.
Syrup . . . ʒj.	Mix and add—
Water . . . ʒiv.	Water . . . ʒvij.
Mix.	Shake and add—
	Syrup . . . ʒss.
	Mix.

The second formula is Mr. Martindale's, who advocated the three covered-pots method. Mr. E. W. Lucas recommends a mixture of acacia mucilage and syrup, 2 ounces each, and sandarac varnish, $\frac{1}{2}$ ounce.

Fine French chalk is used for coating, and it is much improved by having 3 per cent. of light carbonate of magnesia added to it. This mixture should be well sifted through

a lawn sieve several times. The carbonate of magnesia is beneficial because the gastric acid acts upon it, and thus aids in disintegrating the coating. The coating-powder may be sweetened by the addition of 1 ounce of powdered sugar or 5 grains of saccharin to each pound. Obviously the secret of a thin coating is the use of as little mucilage as possible, just as in coating with silver. After a uniform coating has been imparted, the pills are transferred to a clean coater, and rapidly rotated in order to give them a polish.

The following process has been specially recommended for use at the dispensing-counter. It turns out a finished pearl-coated pill in a few minutes. Shake the pills in a covered pot with sandarac-and-ether varnish (page 133) and throw into very fine French chalk, rotate for a minute, and separate excess of powder by sifting. Shake the pills in another pot with a mixture of equal parts of whipped white of egg (strained), syrup, and water, sufficient to wet the pills thoroughly, and throw them into excess of *very fine* French chalk; shake for a minute, remove the pills to a flat marble slab, and rotate *very lightly* under a pill-finisher, sprinkling on a very little chalk until a smooth surface is produced. If time permits they should be exposed to the air in a tray to dry thoroughly.

If the pills are silver-coated first, two coats of chalk suffice to make them pearly white, and the colour does not show through.

Plumbago gives the opposite in colour of pearl-coating by simply rubbing the pills in ordinary powdered blacklead. The method is old, but has never got into favour, although the coating is an excellent protective.

GELATIN-COATING.

Gelatin coating is the most soluble of all, and is now easy of application on account of the simple apparatus which is obtainable for doing the job expeditiously. The gelatin coating has the advantage of being transparent, so that the colour of the pill is seen, and the coating is more quickly imparted than any other.

In the absence of better apparatus we have used the following simple coating device with good results. If, say, three dozen pills are to be coated, take three soda-water corks, and stick into one end of each the eye-ends of a dozen needles at an angle of 45° ; then place a pill on each of the needles. The pills are now ready to receive the coating. Having melted the coating-solution on a water-bath, dip the 'corkful' of pills into it, withdraw, allow the drops of superfluous gelatin to form, and remove them by allowing the pills just to touch the surface of the liquid, then twirl the cork between the forefingers for a few seconds, and set aside to harden.

A convenient and simple apparatus for dispensing-counter work is that devised by Mr. A. J. Palethorpe. It consists of



a tray in which recesses (A) for the pills are carved, and a needle-disc pill-dipper (B) which fits on a quadrangular centre-piece to which a check-bolt (C) is fitted. The pills are put in the tray, and the check-bolt adjusted according to their size, so that the needles just pierce the pills enough to hold them tight. The disc, with the needles, being pressed home, is lifted, dipped in the hot gelatin solution, reversed

for a moment or two, and waved in the air until the solution sets. The pills are then removed with D. The points to be observed in gelatin-coating are :—

(1) An expeditious arrangement for affixing and removing the pills from the needles, so as to avoid touching them with the fingers. A pill-tray with as many holes in it as there are needles, and each hole opposite a needle, is used for charging

the needles. For removing the pills a plate which slides between the disc and the needle-points is the best idea, and is provided in the 'Unique' coater (see 'The Chemist and Druggist Diary, 1898,' page 498).

(2) The coating-solution should be kept as limpid as possible without heating much above 150° F. This is to ensure a thin coating. Coating-solutions are made either of (1) gelatin, (2) acacia and gelatin, or (3) acacia. The second kind is that generally adopted, and the following are formulæ for it :—

	Patch's	Thompson's	Cocks's
Gelatin . . .	℥iiss.	℥iv.	℥iiss.
Boric acid . .	℥ij.	℥ij.	—
Acacia mucilage	℥ij.	℥j.	℥ij.
Distilled water .	℥vij.	℥XL. sat. sol. boric acid	℥vij.

Soak the gelatin in the water until soft, heat on a water-bath until dissolved, add the mucilage, and mix.

The mucilage should be made by dissolving 4 ounces of gum ('flaked' or Trieste picked grain) in 7½ ounces of water.

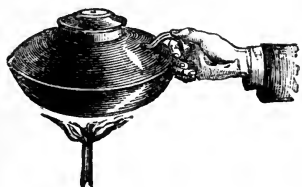
(3) Allow the pills to dip completely in the solution, *withdraw from the solution slowly* (so that superfluous coating may be removed by capillary attraction), and when out, if drops form, touch the surface of the solution with the drops. Finally, turn upside down and allow to dry.

(4) Most gelatin pill-coating machines provide for rotation of the pills after they are dipped. Pill-manufacturers allow the pills to remain at rest at a temperature of 80° F. The object of rotation is to dry quickly, and it is a substitute for rest at a higher than normal temperature. The pills should be removed from the needles as soon as the surface is hard, and before the inner layer of the coating hardens, so that the hole may close with the soft solution and thus exclude air.

On the manufacturing scale gelatin-coating is done with machines which have tubes instead of needles; these terminate in a shallow box connected with a suction-machine, and the pills are thus picked up by atmospheric pressure. One half of each pill is first coated and dried, then the other half.

SUGAR-COATING.

This kind of coating has become popular, but the operation is somewhat difficult to perform on a small scale. Dr. Symes states that with practice it may be successfully carried out by the following process: Pills well dried on the surface are placed in a tinned-copper bowl, such as is represented in the illustration, with a flat bottom, or an enamelled-iron dish, the surface of which has been moistened with syrup, or syrup and gum. They are then rotated and gently heated, very finely powdered sugar being dusted on, and the motion kept up till a perfectly



dry, hard, and whitish coating is obtained, the operation being repeated if necessary. The first attempt is generally a failure, but practice is the only secret. The following methods have also been proposed:—

Albumen and Sugar.—Pills sufficiently firm and dry should be rolled between the finger and thumb with enough white of egg to give them a thin coating. They should then be placed with finely powdered white sugar in a suitable vessel and rotated. The coating thus imparted looks well and has a pleasant taste.

French Chalk and Sugar.—The pills are moistened with syrup or mucilage, or a mixture of the two, by shaking in a covered pot. They are then transferred to a box containing powdered French chalk or a mixture of French chalk and sugar, and are well shaken, and again transferred to a warm pill-tray and kept rapidly rotating until dry and smooth. The operation takes but little time.

The dispenser should not, however, expect to turn out pills with a sugar coating so elegant in appearance as that which is exhibited by commercial sugar-coated pills. The coating on these is done by the art of confectionery, and on the large scale

consists in giving the pills successive coatings of a starch-and-sugar syrup, beginning with a thin one and ending with a thick. The apparatus used is a revolving spherical pan, heated by a coil of steam-pipe, which envelops the wider circumference of the pan. When the pan has reached the proper degree of heat some pills are put into it and allowed to revolve for a minute ; then a syrup, consisting of $1\frac{1}{2}$ pound of sugar and 1 drachm of starch dissolved in 20 ounces of water, is poured into the pan dexterously, so that it may land on a part where the pills are not and yet have time to be smeared on the side before the pills land there. The pan has an eccentric motion, so that the pills are not driven round and round the pan continuously, but from one part of the pan to another, with a noise which reminds one of the intermittent 'hush' of shingle moved on a beach by the tide. A thin coating is thus imparted to the pills, and for success they should, as soon as this coating has a finished but dull-white appearance, be transferred to another pan, where they get a coating of a somewhat thinner syrup, and, finally, to a third, where a syrup (2 pounds of sugar to 20 ounces of water) is applied. After this they are polished in a perfectly clean and smooth pan, or in a special polisher consisting of a cylinder whose circumferential wall is made of bolting-cloth, and which is provided with means for rapid rotation.

CHOCOLATE-COATING.

This is done exactly like gelatin-coating, and with the same apparatus, the following compound being used :—

Cadbury's cocoa-essence	.	.	.	.	.	3j.
Oil of theobroma	.	.	.	.	.	3ij.

Shred the oil of theobroma, and mix with it the cocoa-essence ; place in a dish, and heat gently over a water-bath, stirring all the time to ensure perfect mixing. Dip the pills into this mixture while it is liquid.

KERATIN-COATING.

This is intended to protect pills so that they may pass the stomach undissolved, the keratin being insoluble in the gastric juice, but soluble in the alkaline contents of the intestines. Only fatty excipients (such as kaolin ointment) should be used in massing, and the pills should be covered with a thin layer of cocoa-butter previous to applying the keratin solution. This solution is made from horn shavings, which are first macerated in ether to remove fat, then dried. Next the shavings are digested for several days in a solution of pepsin 4 parts, hydrochloric acid 1 part, and water 95 parts. All that remains undigested is washed, and dissolved in solution of ammonia or acetic acid, and evaporated until only a trace of the solvent is left. The gum-like liquid which remains is the coating-solution, and several thin coats of this are imparted to the pills. The process is troublesome, and not a success, as the coating becomes sticky and nasty.

SALOL-COATING.

Salol-coating has been suggested to take the place of keratin-coating as being less troublesome and quite as effective. The coating is applied as follows: Take the 'Goodess' pill-finisher and sprinkle into it a scruple of salol for every two dozen 5-grain pills to be coated; heat carefully over the flame, moving the finisher all the time, until the bottom of the pan is wholly covered with melted salol. Now put in the pills and rotate until they are evenly coated with the melted salol. Transfer quickly to a photographic developing-dish which has had the chill taken off it, keep the pills rolling in this pan for a minute or so, when the coating becomes hard, glassy-looking, and greyish-white when cold. It should be thin, but if too thick a coating happens to have been applied, clean out the 'Goodess' finisher, put the pills into it, warm, and keep the pills moving until the coating melts; then finish as before. As the coating is apt to chip off, the pills should be dispensed

in boxes, the layers being separated by cotton wool. Another method is to varnish the pills with the following solution :—

Salol	.	.	.	.	.	.	.	.	℥ss.
Tannin	.	.	.	.	.	.	.	.	℥j.
Ether	.	.	.	.	.	.	.	.	℥iiss.

Dissolve.

To be used as a varnish for pills free from adherent powder.

Salol-coated pills are taken one hour after food. The mass must not be of a fatty nature, as fats dissolve salol. Compare also the phenol table, page 97.

CONCENTRIC-COATED PILLS.

These were proposed by the late Dr. Mortimer Granville, and the following formula will show what they are and how prepared :—

Barbaloin.	.	.	.	.	.	.	gr. xxiv.
Ext. cascarae sagradae.	.	.	.	.	.	.	gr. xxiv.
Iridin.	.	.	.	.	.	.	gr. xij.

Fiant pilulae xij.

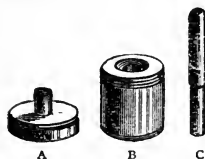
Make the aloin into a stiff mass with as little excipient as possible ; cut into pills and coat with gelatin (hard). Then roll each pill in 2 grains of extract of cascara sagrada, and coat with keratin solution (two coatings) ; finally make the iridin into a mass, divide into twelve portions, and roll each portion round a pill ; varnish or coat with gelatin. The iridin portion of the pill is supposed to dissolve in the stomach, where it is most wanted ; the keratin coating dissolves only when it reaches the duodenum ; and the barbaloin portion begins to dissolve in the intestines, where its action is manifested. [This method of pill-making never caught on, but the description is retained because it is an ingenious way of making incompatibles into pills, as explained under Ergotinum on page 109.]

TABLETS, LOZENGES, AND PASTILLES.

THESE articles more or less resemble each other, especially in respect to the fact that they are generally the product of the manufacturing chemist, and few physicians prescribe remedies to be compounded in any of the forms, as they usually expect them to be ready-made. Nevertheless, all competent dispensers should be able to prepare them at a moment's notice. Several forms of medication go under the name

Tabellæ or Tablets.

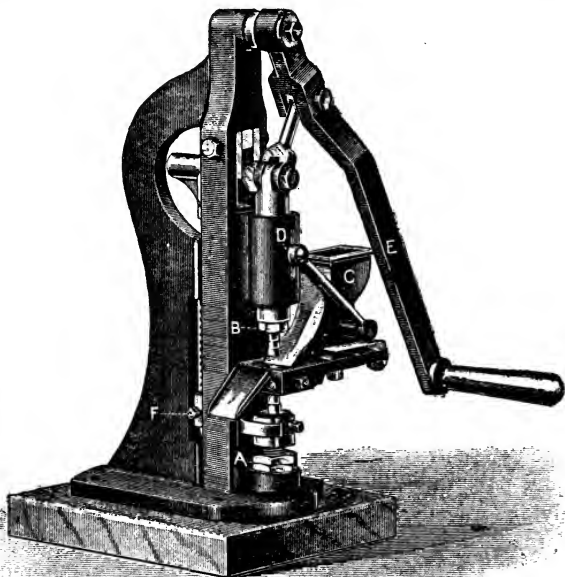
For convenience they may be divided into three classes—(1) tablets made by compression ; (2) tablets made by moulding without compression, commonly called tablet-triturates ; and (3) tablets made from a chocolate basis, as provided by the British Pharmacopœia. Apparatus for the production of



Compressed Tablets work by (1) percussion or (2) pressure. The former requires the simpler form of mould, and is here illustrated. A is the lower die, B the compressing cylinder, and C the plunger, which is put into the cylinder and given one sharp and heavy blow with a mallet, whereby the powder previously placed in the cylinder is moulded into a tablet by percussion.

Moulds of the second type are true compressors, and are of two classes—viz., (1) long lever and (2) power. Of the

first of these, the 'Duplex' is a good example, as it shows the essential parts in a simple combination. Here B is the top punch carrying the upper die and moving in the socket D, the top being connected as shown by the lever-handle E. The lower die is fixed under the bed-plate at A, and the powder to be compressed is put in the hopper c. At each movement of the handle E the hopper c is carried forward by



THE 'DUPLIX' TABLET-MACHINE.

the lever between D and c and fills the hole over A with powder ; next c is pushed back, and simultaneously punch B comes down with force and compresses the powder. The lever E has a double action—that is, one tablet is made by pulling it to the left, and another by pushing it back to the right. Each tablet is brought to the surface as formed, and the hopper c pushes it down the shoot in the act of filling the

mould with powder for another tablet. The weight of the tablet is arranged by fixing the bottom punch A so as to give a hole that will hold exactly the amount of the loose powder desired, and the degree of compression is regulated by adjusting the top plunger B so that it will give a thin or a thick tablet. The degree, once set in the machine, does not alter with the strength of the worker. Dies of various diameters or shapes are obtainable.

The dies for tablet-making must be kept sharp and smooth in surface, in order to get quick action and perfect finish. There are many other forms of compressing-machines on the market, the 'Freck' and 'Eureka' being quite commonly used. The principles aimed at are the same as those embodied in the 'Duplex,' and it is important for the dispenser to note that while such machines give uniform results the simple percussion-mould (page 144) rarely gives two tablets alike.

Preparation of the Material.—Chemical salts which are to be compressed should be in the granular form as supplied for the purpose by chemical-manufacturers. All powders must be granular. On the dispensing scale a considerable amount of 'faking' is necessary in making tablets of pure substances. Thus, an excipient must be added to make the powders adhere, and the dry powder must be sprayed with an ethereal solution of liquid paraffin (3ss. to 3j.) or vaseline (gr. x. to 3j.) immediately before compression. The latter treatment prevents the formation of a clear solution of the tablets in distilled water. The following formulæ by Edel show the requisite treatment :—

FOR DOSES OF A FEW GRAINS.

Example.

Phenacetin	500 gr.
Powdered sugar	50 gr.

Reduce the phenacetin to fine powder, and mix. Moisten with a few drops of syrup and a sufficiency of water. Pass through a No. 20 sieve, dry, and again sift. Spray the powder with 20 to 30 drops of vaseline solution, and make 100 tablets.

In the same manner the following are made :—

Acetanilide, antipyrin, bismuth salts, chloralamide, salicin, salol, and sulphonal.

SMALL TABLETS OF FRACTIONAL GRAIN DOSES.

Example.

Calcium sulphide	gr. xxv.
Sugar of milk	ʒij. gr. v.

Mix thoroughly, add 4 or 5 drops of simple syrup, then moisten with water, and pass through a No. 20 sieve. Dry. Lubricate the granular powder by spraying 10 drops of vaseline solution over it, and make into 100 tablets.

In the same manner may be made tablets of the undermentioned remedies, adjusting the weight of sugar of milk taken to the dose of the medicine. Thus, if aloin tablets gr. j. are to be made, only 50 gr. of sugar of milk is required for the 100 tablets :—

Aloin, arsenious acid, caffeine, codeine, digitalin, extract of nux vomica, mercurous chloride, mercurous iodide, morphine hydrochloride, podophyllin, and strychnine.

These are simple forms. Many substances require no addition, this being especially true of the granular salts ; but even in these cases the addition of 2 to 5 grains of finely powdered French chalk to the powder for 100 tablets is an advantage, the mixture being well sifted. Disintegrating tablets are obtained by adding 2 to 4 grains of powdered arrowroot to each ounce of material. On the other hand, tablets required to dissolve slowly should have 5 per cent. of powdered acacia mixed with the powdered substance before damping and granulating.

Hypodermic tablets are made with a basis of granulated sodium sulphate or sodium chloride. Sodium acetate is used for diluting morphine acetate. The powder for each tablet should be weighed.

Tincture tablets are made by mixing with powdered sugar of milk (1 ounce of tincture to 1 ounce of the sugar). Warm carefully on a water-bath until the mixture is sufficiently dry to granulate through a sieve. Dry in a warm-air cupboard, and compress into tablets of the required size, reckoning each grain of the powder as equal to a minim of tincture.

A mixture of cocoa powder and sugar of milk was suggested by Mr. Stewart Hardwick as a tablet-vehicle, the general formula for one tablet being :—

Medicament	as ordered
Cocoa powder	$\frac{1}{2}$ gr.
Sugar of milk	to 2 gr.

This is compressed in the ordinary way. White and Robinson (B.P.C., 1902) improved upon this by suggesting a mixture of oil of theobroma 1 part, and starch 3 parts, the oil being melted and the starch-powder stirred in before cooling. Of this mixture 1 to 2 parts is added to each 5 parts of the powder to be compressed, mixed well but lightly in a mortar, divided into doses, and each dose compressed. For working on the large scale White and Rodwell (B.P.C., 1903) found certain disadvantages in the 1902 excipient, and devised the following :—

METHOD I.

Theobroma Emulsion.

Oil of theobroma	25	parts
Hard soap	5	„
Tragacanth	0.5	„
Benzoic acid	0.25	„
Water	to 100	„

Dissolve the soap in 25 parts of water by heat, add the hot solution to the melted theobroma, and mix by whisking or agitation; shake in the tragacanth, add the benzoic acid, then the remainder of the water.

METHOD II.

Ether-alcohol Solution of Theobroma.

Oil of theobroma	1 oz.
Ether	to 6 „

Dissolve and add an equal volume of rectified spirit as required for use.

The following formulæ illustrate the use of each solution :—

METHOD I.—The substance to be compressed, in the finest possible powder, should be triturated with sufficient of the emulsion to form a damp coherent powder, so that it can be shaken through a No. 20 or 30 sieve without pressure and without adhering to the meshes. The sifted product, after exposure to the air for a few hours, or during the night, is ready for

compression. If heat is used, the powder must be allowed to stand for an hour or two at least for the theobroma to solidify before compression.

Sodium bicarbonate . . .	40 parts	Bismuth carbonate . . .	3 parts
Oil of peppermint . . .	1 „	Sodium bicarbonate . . .	2 „
Theobroma emulsion . . .	9 „	Theobroma emulsion . . .	1 „

Phenacetin	17.5 parts
Sugar	7.0 „
Glucose	0.5 „
Theobroma emulsion	2.0 „

First add the glucose to the emulsion.

Quinine sulphate . . .	5 parts	Acetanilide . . .	2 parts
Sugar	2.5 „	Caffeine citrate . . .	1 „
Glucose	0.3 „	Sodium bicarbonate . . .	1 „
Theobroma emulsion . . .	1 „	Glucose	0.25 „
		Theobroma emulsion . . .	0.75 „

Saccharin	9 parts	Dried thyroid gland . . .	11 parts
Sodium bicarbonate . . .	8 „	Powdered sugar . . .	10 „
Theobroma emulsion . . .	3 „	Theobroma emulsion . . .	3 „

The dried powder contains half its weight of saccharin.

The dried powder contains half its weight of dried thyroid.

METHOD II.—Add the ether-alcohol theobroma solution all at once to the substance or mixture contained in a mortar; triturate quickly; pass through a No. 20 or No. 30 sieve, and allow to dry by exposure for an hour or two.

Powdered opium . . .	2 parts	Powdered cascara-	
Sugar	1 „	sagrada extract . . .	2 parts
Ether - alcohol theo-		Sugar	1 „
broma	0.75 „	Ether - alcohol theo-	
		broma	a sufficiency

Compound Podophyllin Tablets.

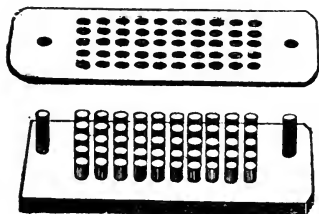
Podophyllum resin . . .	1 part
Calomel	4 „
Alc. extract of bella-	
donna	0.66 „
Sugar	4 „
Ether alc. theobroma . . .	1.5 „

Make into $2\frac{1}{2}$ -gr. tablets, each containing 1 gr. of calomel.

Compound Rhubarb Tablets.

Rhubarb	3 parts
Socotrine aloes . . .	2.25 „
Myrrh	1.5 „
Oil of peppermint . . .	0.175 „
Sugar	4 „
Ether - alcohol theo-	
broma	1.5 „

Tablet-triturates, or moulded tablets, are made with sugar of milk by means of an apparatus consisting of a flat plate of vulcanite having holes bored into it, which fits upon another vulcanite plate upon which are as many projections as holes, and these projections push out the tablets from the holes. Each tablet generally weighs a fraction over a grain, but the weight of the tablets formed by the mould is determined by making powdered sugar of milk into a paste with proof spirit. The paste should have such a consistency



TABLET-TRITURATE MOULD.

that it will just spread with a spatula. The mould is filled with the paste, the tablets pressed out, dried, and their weight taken. From this the weight of sugar of milk required for the desired number of tablets is calculated, a portion, *equal to the bulk* of the medicament to be added, being deducted. The medicament is triturated thoroughly with the sugar of milk, made into a stiff paste with proof spirit, and moulded as above directed.

Official Tabellæ.—Trinitrin tablets are the only official example of this form of medication, and they are described as ‘tablets of chocolate each weighing 0·300 gramme and containing 0·0005 gramme (0·5 milligramme) of the trinitroglycerin of commerce.’

The British Pharmacopœia gives no formula for tabellæ trinitrini. The following is Mr. Lucas’s method of making them :—

Alcoholic solution of nitroglycerin (10 per cent.)	100 parts
Powdered chocolate	1,450 parts
Powdered sugar	2,500 parts
Mucilage of acacia	390 parts
Powdered acacia	360 parts
Distilled water	200 parts

All by weight.

Mix the powders, add the solution of nitroglycerin, and stir *with a light hand* until evenly mixed. Add the mucilage and water, and work up to a soft mass; roll into a cake, and divide into lozenges weighing exactly 5 grains.

The following is from 'Pharmaceutical Formulas':—

Fry's cocoa powder (without oil)	. . . . .	3 oz.
Powdered sugar	. . . . .	6 oz.
Oil of theobroma	. . . . .	4½ oz.
Nitroglycerin	. . . . .	24 gr.

Mix the cocoa powder with the sugar, and pass through a fine sieve. Liquefy the oil of theobroma on a water-bath, and dissolve the nitroglycerin in it. Then add the powders, stirring the whole well together, and when mixed cut into 2½-grain tablets.

The advantage of Mr. Lucas's formula is that the commercial solution of nitroglycerin is employed in making the tabellæ. The second formula is a manufacturer's.

The 'Physicians' Pharmacopœia' method of preparing chocolate tabellæ is as follows:—

The cocoa and other ingredients, including the medicine to be administered, are rubbed together in a mortar, massed, in the same way as a pill-mass, with the liquid excipient, and cut into pills on a pill-machine. Each pill is then taken, dusted with a powder of equal parts powdered sugar and arrowroot to prevent sticking, and placed in a tube of brass or wood standing vertically on a tile, an accurately fitting piston of wood giving a round form to the lozenge on being forced down the tube on the top of the pill. The tablets may also be turned out without the mould, by simply placing the mass on the cutter of the pill-machine after piping, and pressing down the upper cutter upon it, oblong or square tablets resulting, according to the amount of mass used.

For most medicines this process answers admirably, but there are some which could be administered in lozenge form were it not for their nauseous taste, which requires an amount of cocoa and sugar to disguise it scarcely compatible with the dimensions of an ordinary lozenge. In such cases Mr. Harold Wyatt recommends glycyrrhizin (the sweet principle of liquorice-root) and saccharin as substitutes for the sugar. He finds, for example, that 5 grains of antipyrin is rendered almost

tasteless by $\frac{1}{3}$ grain of glycyrrhizin, and that the intense bitterness of strophanthus is covered by the addition of $\frac{1}{6}$ grain of saccharin to every 5 minims of tincture in the tablet. The following formula of Mr. Wyatt's will serve as an example:—

Tabellæ Acidi Arseniosi.

Trituration of arsenic (1 in 100)	. . . . .	48 grains
Cocoa powder	. . . . .	70 grains
Tragacanth powder	. . . . .	24 grains
Saccharin	. . . . .	1 grain
Alcohol	. . . . .	30 minims
Essence of vanilla	. . . . .	24 minims
Distilled water	. . . . .	30 minims

Place the cocoa powder in a warm mortar; when melted add the powders, previously well rubbed together, and, after the mass has set, powder it with the aid of the alcohol and essence of vanilla; mass with the water, and divide into forty-eight tablets.

Lozenges are rarely required to be made extemporaneously, which is a good reason for saying something here about how they are made. The British Pharmacopœia gives formulæ for four bases as follows—the quantities in brackets being the author's:—

Fruit Basis.—Take five hundred times the quantity of the drug ordered for one lozenge. Mix with 6·5 grammes [100 grains] of tragacanth and 26 grammes [400½ grains] of refined sugar, both in fine powder. Add sufficient of the black-currant paste of commerce to produce 650 grammes [22 oz. 385 grains], beat into a uniform mass, divide into 500 equal lozenges, and dry in a hot-air chamber at a moderate temperature.

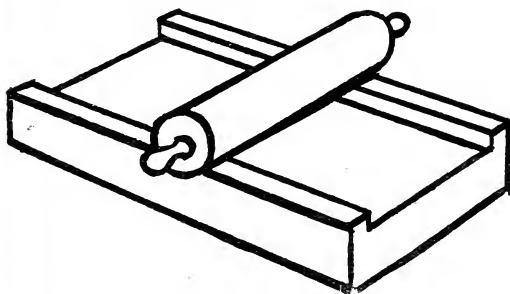
Rose Basis.—Take five hundred times the quantity of the drug ordered for one lozenge. Treat it as described under 'Preparation with simple basis,' previously mixing with the refined sugar 0·025 millilitre [$\frac{1}{40}$ minim] of oil of rose.

Simple Basis.—Take five hundred times the quantity of the drug ordered for one lozenge, mix it with 496 grammes [$17\frac{1}{2}$ oz.] of refined sugar and 19·5 grammes [300 grains] of gum acacia, both in fine powder. Make the mixture into a paste with 35 millilitres [1 fl. oz. 115 minims] of mucilage of gum acacia and a sufficient quantity of distilled water, divide into 500 equal lozenges, and dry in a hot-air chamber at a moderate temperature.

Tolu Basis.—Take five hundred times the quantity of the drug ordered for one lozenge; dissolve such salts of alkaloids as may be ordered in 10

millilitres [170 minims] of distilled water. Mix the solution with 482 grammes [17 oz.] of refined sugar and 19·5 grammes [300 grains] of gum acacia, both in fine powder. Incorporate 10 millilitres [170 minims] of tincture of balsam of tolu and any other drugs ordered for the lozenges. Make into a paste with 35·5 millilitres [1 fl. oz. 120 minims] of mucilage of gum acacia and a sufficient quantity of distilled water, divide into 500 equal lozenges, and dry in a hot-air chamber at a moderate temperature.

A mortar may be used for massing the lozenge-ingredients. The lozenge-machine resembles a pill-machine, but the sides do not slope, and are generally made to adjust to the required thickness of lozenge. A cylindrical roller is used for spreading out the mass, a mixture of starch and sugar being employed to



LOZENGE-PASTE ROLLER.



LOZENGE-CUTTER.

keep it from sticking. For dispensing-purposes it will suffice to divide the mass into equal weighed portions, and form into a lozenge by squeezing into the lid of a pill-box, or any suitable mould. Otherwise the mass should be rolled and cut with a lozenge-cutter or into rectangular lozenges with a knife.

Pastilles are soft, jelly-like jujubes, variously medicated, made from a gelatin and glycerin base, called in the Throat Hospital Pharmacopœia 'Glyco-gelatin,' which is best made according to the following formula:—

Refined gelatin	1 oz.
Glycerin	2½ oz. (by weight)
Tolu-water	2½ oz. „
Ammoniacal solution of carmine	a sufficiency

Cut the gelatin into shreds and soak in the tolu-water for two hours ;

then transfer to a water-bath and heat with the glycerin until the gelatin is dissolved. Colour with the carmine solution, and pour into an oiled tray to cool.

The tolu-water is the liquor made by boiling $1\frac{1}{4}$ ounce of balsam of tolu in 20 ounces of water (contained in a covered vessel) for half an hour and straining off 16 ounces.

The solution of carmine is made as follows :—

Carmine	30 gr.
Solution of ammonia	a sufficiency

Dissolve the carmine in 6 drachms of the ammonia solution, filter, and wash the filter with more ammonia until 1 fluid ounce has been collected.

The medication of the pastilles is accomplished by melting the glyco-gelatin on a water-bath, adding the medicine (previously rubbed to a thick syrup with glycerin, if a powder), stirring until nearly cool, and pouring into an oiled mould.

Flavours for the pastilles other than tolu-water are the fruit-juices, orange-flower water, and glycyrrhizin. Rose or cinnamon water may also be used. Two drachms of cherry-laurel water with $2\frac{1}{4}$ ounces of distilled water imparts a pleasant almond flavour. Raspberry-juice may be used in the same proportion as orange-flower water, lime-juice in the proportion of half juice and half distilled water. Glycyrrhizin, 24 grains, dissolved in the water used to soak the gelatin, imparts an excellent liquorice flavour, which is useful to hide the taste of ammonium chloride.

The following examples from 'Pharmaceutical Formulas' show the nature of the combinations :—

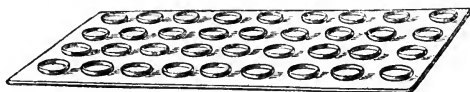
AMMONIUM-CHLORIDE PASTILLES.

Ammonium chloride . ʒiij. gr. xij.
 Ammonia glycyrrhizinate gr. xxiv.
 Glyco-gelatin (with-
 out carmine) . ʒviiij.
 To make 96 pastilles.

COCAINE PASTILLES.

Cocaine hydrochloride . gr. xij.
 Citric acid . . . gr. xxxij.
 Oil of lemon . . . mxxiv.
 Glyco-gelatin . . ʒviiij.
 To make 96 pastilles.

These pastilles should be made into circular discs with bevel-edges by means of Mr. F. Bilson's mould (made by



Toogood), which is simply a series of small circular tin saucers secured to a metal base. This mould is exceedingly convenient, and the finished pastilles have the best appearance.

Glyco-gelatin pastilles are the most convenient form of lozenge for extemporaneous preparation. The following are the doses of medicaments usually required in each:—

Acetomorphine hydrochlor. $\frac{1}{12}$ gr.	Cocaine hydrochloride, T.H. $\frac{1}{10}$ gr.
Acid, benzoic . . . 1 gr.	Codeine . . . $\frac{1}{10}$ gr.
Acid, boric . . . 2 gr.	Eucaïne . . . $\frac{1}{10}$ gr.
Acid, carbolic . . . $\frac{1}{2}$ gr.	Guaiacum resin . . . 2 gr.
Acid, lactic . . . 2 min.	Eucalyptus oil . . . $\frac{1}{2}$ to 2 min.
Aconite tincture . . . 1 min.	Iodoform . . . 1 gr. (more or less)
Ammonium bromide . . . 3 gr.	Ipecacuanha, liquid extract $\frac{1}{4}$ min.
*Ammonium chloride, T.H. 2 gr.	Menthol, T.H. . . $\frac{1}{6}$ gr.
Apomorphine hydrochloride $\frac{1}{30}$ gr.	Morphine acetate . . . $\frac{1}{30}$ gr.
Bismuth carbonate, T.H. 3 gr.	Pine oil (pumilio) . . . 1 min.
[Also with morphine acetate $\frac{1}{30}$ gr.	Potassium chlorate . . . 2 gr.
or potassium chlorate 2 gr.]	Salol . . . 2 $\frac{1}{2}$ gr.
Borax . . . 2 gr.	* { Senna pod ext. . . 5 gr.
Caffeine . . . $\frac{1}{2}$ gr.	{ Coriander oil . . . $\frac{1}{12}$ min.
Ditto with menthol $\frac{1}{10}$ gr.	Terebene . . . 2 min.
*Cascara sagrada extract. 2 gr.	Terpin hydrate . . . 1 gr.
*Coca extract . . . 2 gr.	Thymol . . . $\frac{1}{32}$ gr.

The glycyrrhizinated glyco-gelatin may be used for those marked *, and the carmine-coloured one for the others. The glyco-gelatin basis is not suitable for astringent medicaments, such as red gum, rhatany, or any other tannic substances.

CAPSULES.

THERE was nothing about capsules in the earlier issues of the 'Art of Dispensing,' and the chapter introduced into the 1888 edition began with the remark that 'a growing disposition on the part of medical men to prescribe nauseous medicines in capsules makes it necessary for the dispenser to be acquainted with the details of the operations of capsule-making.' At that time one could count the capsule-makers in Great Britain on the fingers of one hand, and the chapter referred to was the first treatment of the subject in an English text-book. The gelatin capsule was invented by Mothes in 1833, and the French Academy of Medicine declared his invention to be an immense service to science and to humanity. (See *The Chemist and Druggist*, 1889, II. 214.) The original capsule was hard, as gelatin, gum arabic, and refined sugar were its constituents : glycerin, then being unknown, was not an ingredient. There was a demand for capsules in England from the first, and they were spoken of by Cooley in 1843 as 'the common gelatine capsules.' Mr. John Warrick, of London, was agent for Mothes, and Messrs. Morgan Brothers later took up the agency for Denoual, of Paris. The manufacture was commenced in this country in the 'forties by Mr. Bateman and Mr. Turner, of London, but it was not until the 'eighties that prescribers began to order capsules as they do pills, and articles in *The Chemist and Druggist* urged the need for dispensers acquainting themselves with the methods of manufacture. Now there are many makers of capsules in the wholesale way, and leading dispensing establishments have capsule-equipments so that they may compound any capsule-prescription which is presented to them.

A form of capsule which is generally considered to be American in origin and comparatively new, is the empty



gelatin one, here figured. These capsules are made of a thin and tough film of gelatin, and are provided with a lid which slips over the open end to close it. Perhaps they originated independently in the United States (their wholesale production certainly did), but at an evening meeting of the Pharmaceutical Society of Great Britain, held on October 12, 1842, such capsules were exhibited, and the following paragraph in respect to them is quoted from the *Pharmaceutical Journal*, ii. 343 :—

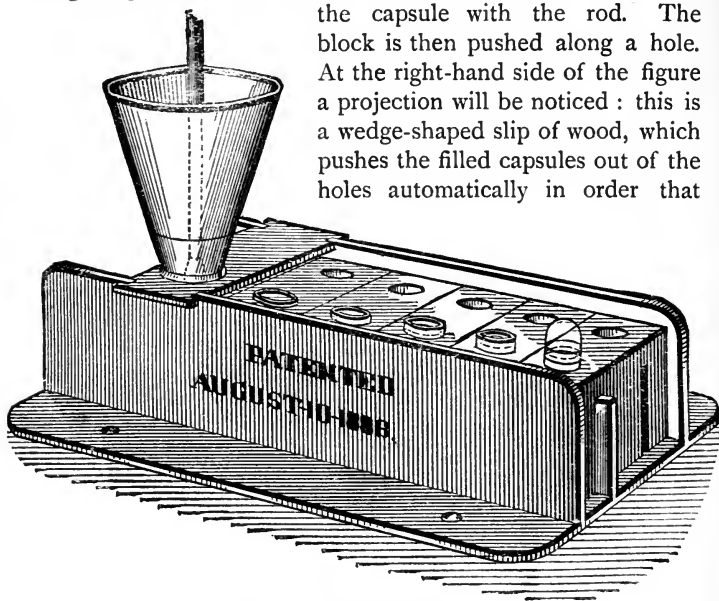
Some GELATINE CAPSULES, contrived by Mr. Chaston, of Walton, in Norfolk, for administering fluid medicines to HORSES and DOGS, were exhibited to the meeting. They were open at one extremity, which required a covering of skin, after the introduction of the fluid. It is scarcely necessary to add that, if water be introduced, they should be administered in the course of a few minutes ; but they are chiefly adapted for the administration of spirit of turpentine, or any other substance in which gelatine is insoluble. The horse-capsules are about the size of an ordinary horse-ball, and when wrapped up in paper in the usual way have a similar appearance.

A French capsule-maker named Planten, who settled in New York in 1836, and whose business is still carried on by his successors, is said to have brought this idea into the market in the early years of his residence there, but it was not until 1860 to 1863 that empty capsules began to be appreciated in the United States, when they were re-introduced. In his interesting history of this subject (*Proceedings of the American Pharmaceutical Association*, 1896) Dr. Alpers does not mention Chaston's early effort.

The empty capsules now obtainable are chiefly used for dispensing powders and pill-masses, although globular and oval capsules for liquids are also obtainable. The capsules

are filled by means of such an apparatus as the 'Acme,' which consists of a nickelled metal case into which slides a block of wood with holes for twelve capsules. The funnel for filling is placed as shown, and the perforated block is inserted under it, so that it travels from left to right. The dispenser puts the weighed portion of powder into the funnel and presses it into

the capsule with the rod. The block is then pushed along a hole. At the right-hand side of the figure a projection will be noticed : this is a wedge-shaped slip of wood, which pushes the filled capsules out of the holes automatically in order that



'ACME' CAPSULE-FILLER.

the lids may be added. The margin of the capsule is generally wetted before the lid is put on. When the medicine is massed like a pill, the mass is divided on the pill-machine by pressing the pipe on the cutter to form cylinders, and each of these is inserted into a capsule of suitable size. Empty capsules are also made with a pointed lid for use as suppositories.

For Extemporaneous Production of capsules the first requisite is the gelatin mass. As already stated, capsules are either hard or soft. The former were the first introduced,

but the latter are now deservedly the more popular, for they are more easily swallowed. The mass for hard capsules is made according to the following formula :—

Gelatin	6 oz.
Gum acacia	1 oz.
Powdered sugar	1 oz.
Water	5 oz.

Steep the gelatin in the water, when soft add the gum and sugar, and heat until dissolved, removing any scum which rises to the surface.

Various forms have been proposed for the soft capsules, and the following has been found to give a good flexible mass which provides a capsule practically unalterable in most atmospheric conditions :—

Gelatin	30 oz.
Glycerin	15 oz.
Mucilage of acacia	7½ oz.
Water	50 oz.

Steep the gelatin in the water, when soft add the mucilage and glycerin, dissolve by the heat of a water-bath, and mix thoroughly by stirring.

For some purposes (as when the capsules are to hold a ferrous mass) the latter formula is amended by omitting



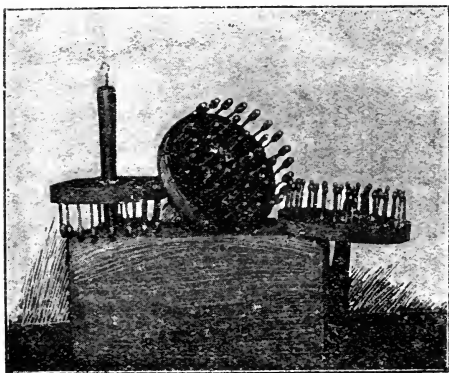
CAPSULE-MASS WATER-BATH ON GAS-STOVE.

3 ounces of glycerin and adding 2 ounces of sugar. The water-bath should be of a special form, so as to admit the

mould-holder easily. That figured on page 159 consists of an outer water-pan 14 inches deep and 12 inches in diameter. It is made of tinned copper. The inner pan is 3 inches shorter and an inch less in diameter. It is provided with a rim to suspend it in the outer pan, and with a flat lid which lies on the top, and is reversed each time it is taken off when the pan is in use. The capsules are moulded in two ways. In the modern French method thick steel plates, with longitudinal halves of capsules formed in them, are used to mould the capsules from soft sheets of gelatin mixture. One of the plates is covered with a sheet of the gelatin mixture, and the requisite amount of medicine is introduced into it, then the upper sheet is placed over it, air bubbles expelled, and the two moulds placed in the press. This method is used on the manufacturing scale, and the principle is employed in making palatinoids and perles.

For dispensing-purposes moulds are made of brass and fixed to rods which screw into a disc of wood provided with a handle securely fixed into the centre of the reverse side. The moulds are made in sizes varying with the capacity of the capsules, and one dipper carries fifteen to sixty moulds according to size. The gelatin mass is generally kept ready for use, and when one has to make a batch of capsules the water-bath, with 2 to $2\frac{1}{2}$ inches of water in it, is put on the gas-furnace, the inner pan inserted, and some of the mass put into it. The moulds are now prepared by wiping them with an oily cloth. As soon as the mass is properly melted, the lid of the pan is removed and the dipper lowered into the pan, so that the moulds are immersed about an inch below the surface of the gelatin mixture. Care should be taken to remove skin or froth from the surface to the side before the dipper is put in. Once in, the dipper is rotated gently to ensure a uniform coat, and then it is slowly withdrawn; the object of slow removal being to form a thin capsule, the excess of gelatin mixture being drawn off by the bulk through capillary attraction. If this is done well, no objectionable drop forms at the base of the capsule. When the dipper is clear of the pan it is

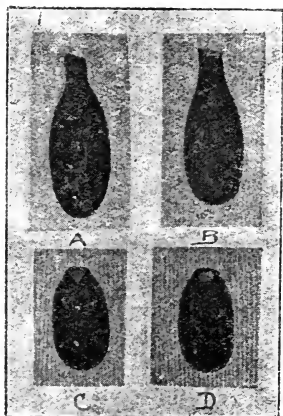
quickly turned upside down, so that the semi-fluid coating, which is now tending to form a drop at the base of the capsule,



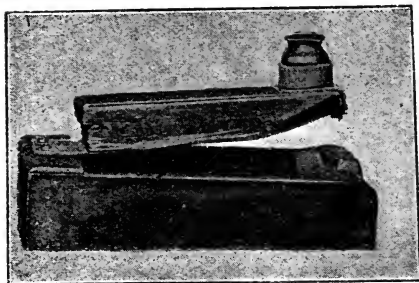
SET OF BRASS MOULDS MOUNTED ON DIPPERS.

may spread uniformly over the mould. In a few seconds the capsule 'sets,' and in a few minutes is easily removed with the fingers; it then looks like A or B in the annexed engraving.

The ordinary narrow-mouthed capsule is either ovate (B) with the narrow end somewhat elongated, or oval (A), with a more or less distinct shoulder. In the former case it is difficult to know where the capsule ends and the neck begins; and as the part to be removed is practically cylindrical it may be cut off with scissors. The oval capsule, however, cannot be trimmed successfully with a straight-edged cutter; if it be cut through between shoulder and neck with a knife or scissors, the resulting 'mouth' is not round, but lipped (C). Such a

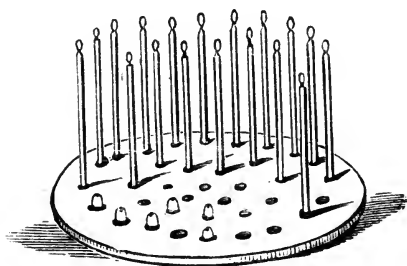


capsule is difficult to fill, and the lips do not seal up neatly. A curved cutting edge is better, and we have this in the cutter



CAPSULING CUTTER AND BOX.

were used for this (see below), but it is better to have holders for the purpose made of wood, cardboard, or metal.



OLD-FASHIONED DIPPER.

figured, which has a flat surface immediately under a gouge-shaped knife fixed into the spring top-piece of the cutting-box, into which the 'cut-offs' drop. After the 'tails' are removed the capsules are placed on suitable trays with holes. The old-fashioned dippers

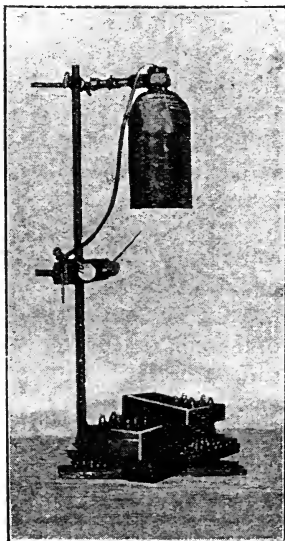
Some dispensers use a suppository-mould. Holders are included in the illustrations given on the following page.

For filling capsules many methods are in use. The French employ for liquids any convenient reservoir with

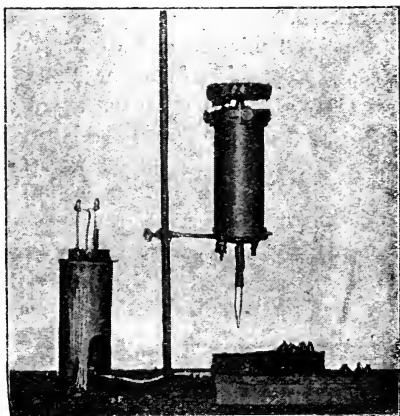
a tap, heating the substance if it is too thick, as in the case of castor oil and copaiba. This is inadmissible. For limpid liquids such an arrangement as the gravitation filler is as good as any. The liquid is put into any convenient vessel (a funnel with narrow stem or a separating-funnel is suitable), an india-rubber tube is attached to the stem and fitted with a glass nozzle and spring clip to control the flow of the liquid. For filling a few capsules ordered by prescription, an ordinary glass

syringe answers perfectly ; the nozzle being drawn out to the required calibre in a Bunsen or blowpipe flame, and the end cut off so as to leave a point of suitable size ; the cut edge is then carefully fused by holding it for a second or two in the extreme edge of a small Bunsen flame. A more elaborate arrangement is that devised by Mr. J. A. Forret, of Edinburgh, which is excellent for viscous liquids, such as castor oil and cascara sagrada extract. This is a brass syringe with screwed piston-rod, which enables the operator to put strong pressure on the contents of the syringe. In filling, care has to be taken that the liquid does not overflow—in fact, a fraction of a minim of space should be left in the capsule, otherwise the closing operation may be difficult.

Closing is done by a brush or glass rod dipped in the melted gelatin mass, or by a small metal bolt applied hot to the neck of the capsule, or by a bolt dipped into the gelatin mass. The brush method does not make a secure joint ; with the hot, dry bolt one requires



GRAVITATION FILLER.



FORRET'S SYRINGE FILLER.

about $\frac{1}{8}$ inch of neck to be left on the capsule, while in the third method we have the analogue of the soldering-bolt. An appliance for the last method is shown to the left of the syringe filler. It is a small brass vessel, similar to the tinned copper for the capsule-mass, suspended in a cylindrical tin. On one side of the tin is a hole to admit a small Bunsen burner, and round the top is a series of holes for ventilation; the tin is soldered to a heavy metal foot. The brass vessel carries an arm of stout wire with two loops projecting over the vessel. The bolt is made by soldering a capsule-mould into each end of a short length of brass tubing. A sufficient quantity of gelatin mass is melted by the Bunsen, and kept a trifle below boiling. The support of the bolts is so adjusted that the moulds are just under the surface of the gelatin. The bolt thus acquires a sufficient temperature to fuse the mouth of the capsule on which it is allowed to press for a second or two, and carries with it sufficient material to close and give a rounded finish to both ends of the capsule. The second bolt is heating while the first is being used. When a dozen or two capsules are being made by prescription the glass-rod or brush method of closing suffices. In this case a better finish is given to the capsules by afterwards dipping the end of the capsule halfway up in the gelatin mixture and drying rapidly, but one must be an adept before this refinement is attempted.

Only a few drugs are capsuled as dry powder. The usual method of doing this is to weigh or divide as for powders, and fill through a small funnel with a suitable nozzle, fixed at a convenient height in the clamp of a retort-stand. The diameter of the nozzle is a trifle greater than the mouth of the capsule, but allows the latter to be readily slipped over the end. In some instances—*e.g.*, Bland's pill-mass—the powders are made into a thin paste with a suitable liquid medium and the paste is introduced by means of the pressure-syringe.

POWDERS.

THERE is a right and a wrong way in compounding powders, but fewer difficulties occur in this class of medicines than in any other, most likely on account of the fact that chemical solids do not interact readily until they are brought into solution. A list of solids which liquefy when mixed with each other is given on page 97, and dispensers should make themselves familiar with it.

In Mixing, the rule is to take the smallest or most potent ingredient first and triturate it in the powder-mortar with some other ingredient which will assist in comminuting it well, as in the following instance :—

Morphinæ hydrochloridi	gr. $\frac{1}{12}$
Bismuthi subnitratis	gr. v.
Pepsini	gr. ij.

Fiat pulvis. Mitte tales duodecim.

Here we weigh the bismuth subnitrate and put a few grains of it in the mortar, then put on it the morphine hydrochloride, triturate lightly, add a little more bismuth subnitrate, triturate, and so on until half the bismuth subnitrate is used ; then add half the pepsin, triturate, the rest of the bismuth subnitrate and pepsin, again triturate, and finally sift, or mix well on paper with a bone spatula.

Never rub so hard that the powder cakes ; that is bad pharmacy. A glass mortar is used for the very reason that it suggests gentle trituration. Also note that friction induces

electricity in many instances—so much so that when the spatula is put into the powder the metal gets a coating of the electrified powder, which is somewhat difficult to remove.¹ Indiscriminate use of mortar and pestle is bad. Here, for example, is a prescription of the late Sir Morell Mackenzie's, which was in the first instance dispensed by a well-known West-end pharmacist, and gave satisfaction :—

Bismuthi subnit.	.	.	.	.	.	gr. $\frac{1}{8}$
Pulv. catechu.	.	.	.	.	.	gr. $\frac{1}{12}$
Morphinæ hydrochlor.	.	.	.	.	.	gr. $\frac{1}{16}$
Fiat pulvis. Mitte tales lxxij.						

The powders were used for insufflation in a case of chronic sore-throat. The second pharmacist who dispensed the prescription was an ardent advocate of the mortar-and-pestle method, and he lost a customer by the practice of his principle. The third with his spatula mixed the powders on a powder-paper, and the patient no longer sent to London in order to get the prescription dispensed. The complaint made of the powders sent out by the second pharmacist was that they had a lumpy feeling in the throat, and did not adhere so kindly as those supplied by the first and third dispensers. No doubt the heat of friction had caused aggregation of the catechu with the other ingredients.

It has been shown by Mr. Boa, of Edinburgh, that the method of mixing materially affects the miscibility of powders. The general conclusion arrived at from Mr. Boa's experiments is that powders mixed on paper and sifted are more readily miscible in water than those which have been rubbed up in a mortar and sifted. We quote two instances in which this effect may be readily observed :—

Pulv. rhei	.	.	.	.	.	gr. x.
Pulv. cinnamom.	.	.	.	.	.	gr. vj.
Magnes. levis.	.	.	.	.	.	gr. xx.

¹ If the spatula is dipped in powdered French chalk beforehand, the adhesion is reduced.

If these ingredients are rubbed up in a mortar the powder diffuses in water with exceeding difficulty, whereas when mixed on paper it diffuses quickly.

Pepsin.	gr. ij.
Bismuth. alb.	gr. v.
Magnes. carb.	gr. iij.
Pulv. aromat.	gr. j.

When these are rubbed up in a mortar, and sifted, the powder can be mixed in water only with considerable difficulty, but when mixed on paper the difficulty is not experienced.

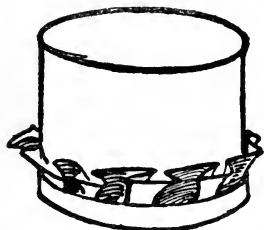
The following powder is a distinct exception :—

Sulphur. præcip.	gr. xv.
Guaiac. resin.	gr. x.
Magnesia	gr. xx.

The most readily miscible powder is here obtained by rubbing the guaiacum and magnesia well together before adding the sulphur. If the powders are mixed on paper they will scarcely diffuse in water.

It is quite evident that there is an art in powder-making, as there is in pill-making, the only difference being that in the former case dissatisfaction is experienced by the customer, in the latter by the dispenser—a sufficient reason, therefore, to call forth the care and ingenuity of the dispenser in mixing powders. In the great majority of cases, where limited quantities are ordered, say under 2 drachms—such, for example, as one or two dozen powders—no better or quicker method of mixing the powders can be adopted than the spatula and a sheet of white paper. The ingredients ordered in smallest quantity should be first thoroughly incorporated, and the larger quantities added gradually. It has been customary to condemn this method as bad compounding, but it is quite the contrary. Experiment has demonstrated that mixture in this way is the most perfect. This is now being generally recognised, and the use of a mortar as a means of mixing substances already in powder is rapidly being abandoned. Special spatulas are now being made for the

purpose of mixing powders. In practice it is easier to wipe a spatula clean than to wash a mortar. It is the only admissible plan in some cases, the paper-and-spatula mixing being followed by sifting through an extemporised sieve made by removing the bottom from a chip box, and securing a piece of muslin to it with the band of the lid as shown in the illustration. This is the method by which most powders containing potassium chlorate should be mixed, *e.g.* :—



SIEVE EXTEMPORED FROM
MUSLIN AND CHIP BOX.

Pulv. potassii chloratis . . .	5ij.
Acidi tannici . . .	5j.
Misce. Pro gargarismâ.	

A dispenser triturated these in a mortar. There was a violent explosion, which does not happen when the chlorate is

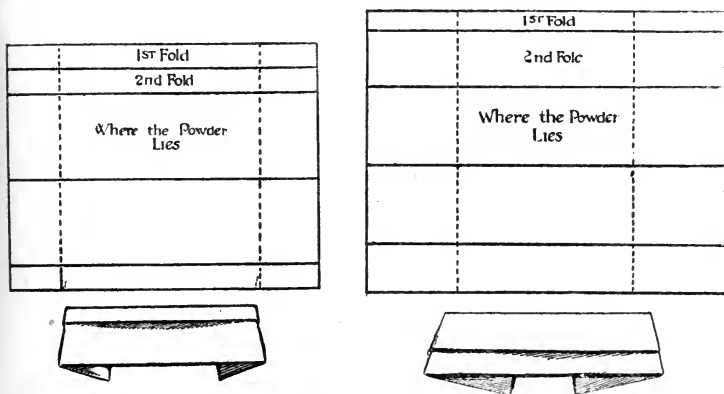


HORN SPATULA FOR MIXING POWDERS.

smoothed down on paper with a horn or bone spatula and the tannin then added and mixed.

Division of Powders.—The only method of division which is tolerated by examiners is weighing each powder. No guesswork is allowed. While we endorse this view we cannot overlook the fact that experienced dispensers divide, say, a drachm of compound jalap powder into twelve powders so well 'by guess' that there is not 1 per cent. of difference between any two of the powders. It is all a matter of practice, and if the dispenser begins by learning to divide by means of the scales and weights, he becomes as expert in dividing as the man who divides by guess. There are various mechanical contrivances for dividing, but they have never come into favour in this country, and the tendency is entirely towards division by weight.

Folding.—A convenient size of paper for powders is 5 inches by 4 inches, but the size should be proportionate to the powder. The paper should be good calendered demy, rather to the thin side. In placing the papers on the dispensing-counter it is customary—say, in the case of a dozen powders—to arrange them in fours, leaving about 2 inches square of the first two rows exposed to receive the portions of powder. This is the arrangement for dividing by eye; but it has become the custom also in the more accurate method of division. After all the papers have received their portions of



DIAGRAMS SHOWING HOW POWDERS ARE FOLDED, WITH SKETCHES OF THE FINISHED POWDERS.

powder, the dispenser begins to fold them. This operation is simple enough. The powder is tilted to the centre of the paper, the side of the paper nearer the dispenser is raised and placed about a quarter of an inch from the edge of the other side, and, keeping a thumb on each end of the upper half, the forefingers lift the lower half, bring it over, and meeting at the centre are swiftly drawn to the edges, thus making the fold. A double fold is next made in the same manner. The aim in folding is to make the whole of a set of powders exactly the same width in fold, as well as the same

length. The latter is easily fixed by a powder-folder, but the width of fold is a matter of practice and eye-judgment. The sketches on page 169 show how it is done. The smaller sketch represents a piece of paper $4\frac{1}{4}$ inches long and $3\frac{1}{4}$ inches wide. The first fold was $\frac{3}{8}$ inch deep, and the second was the same ; then $\frac{7}{8}$ inch at each end was turned over by means of the folder. The finished powder is shown at the bottom of the sketch, $2\frac{3}{4}$ inches long by $1\frac{1}{8}$ inch wide. This method may be called edge-folding. The second example represents a powder-paper $5\frac{7}{8}$ inches long, and $4\frac{3}{8}$ inches wide. The first fold was $\frac{3}{8}$ inch deep, as in the former case, the second (arranged so that the fold should lie nearer the edge of the powder, as it is not so pleasing when exactly in the centre) was $\frac{7}{8}$ inch deep, and the cross-foldings were made so that the ends overlapped each other by $\frac{1}{8}$ inch. The finished powder was $2\frac{3}{4}$ inches long and $1\frac{1}{4}$ inch wide. When powders are to be wrapped in waxed paper it saves a folding if the waxed paper and white demy paper are put down together, the waxed paper being about $\frac{1}{4}$ inch smaller each way than the outer white paper. Deliquescent powders should be folded in this manner, and it is always advisable to cover with tinfoil powders which have to go to damp and hot climates.

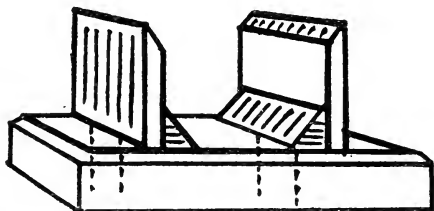
The German Method resembles the former, but the German apotheker buys his powder-papers ready folded, and cross-folded at one end. If he has to dispense a dozen powders, he weighs or divides (generally the latter) the required quantities of powder, putting each portion upon a horn scoop, next takes a dozen folded papers between the thumb and fingers of the left hand, and one after the other opens them, placing the contents of a scoop into each, and dexterously cross-folds each paper with the forefinger and second finger of the right hand.

The Powder-folder is a valuable implement to most dispensers. It is well to learn powder-folding with it rather than without, for powders of unequal length are as irritating to

the equanimity of a practised pharmacist as pills of unequal size. The length of the folded powder should be about $\frac{1}{8}$ inch less than the length of the powder-box, or $\frac{1}{4}$ inch less than the powder-envelope. A block of wood somewhat longer than it is wide, and wider than it is deep, is the simplest folder. Next comes the kind made of two plates of brass with a pillar between, then the adjusting folder here illustrated.



MAW'S POWDER-FOLDER.



POWDER-FOLDER MADE OF WOOD.

The second figure is a home-made folder—viz., a suitable box with two movable uprights in it which can be secured through the sides of the box by means of pegs. Punctilious dispensers record in the prescription-book the length of powders dispensed in particular cases. It is important to observe in folding that none of the powder gets in the turned-over parts of the paper.

SPECIAL MEMORANDA.

Ammonium Carbonate.—Rarely prescribed in powders, but if so wrap in waxed paper.

Antipyrin (Phenazone).—This substance is eminently a remedy which should be prescribed by itself, unless for physiological reasons a little caffeine is added to counteract heart symptoms. Prescribers go more upon their personal experience than physiological experiments, and combine things with antipyrin which sometimes trouble the dispenser, as in the following instances :—

I.			II.		
Antipyrin.	.	gr. x.	Phenazoni	.	gr. v.
Sodii salicylatis	.	gr. xx.	Caffeinæ citratis	.	gr. v.
Fiat pulvis.	Mitte xij.		Sodii nitritis	.	gr. iss.
Sig. : One every four hours.			Fiat pulvis. Mitte tales vj.		

Antipyrin and sodium salicylate liquefy when mixed together, salicylate of antipyrin being formed. This is not at all dependent upon external moisture, therefore wrapping in waxed paper does not obviate it. A dispenser reported that No. I. powders had been dispensed dry: in that case antipyrin salicylate (salipyrin) had been given. The substitution may be suggested to the prescriber: it would be wrong to adopt it in such a case as the above, because salipyrin contains less than half its weight of salicylic acid. The second prescription furnishes a powder which becomes green and finally red. This is due to the moisture in the ingredients, especially in the sodium nitrite, liberating citric acid from the caffeine citrate (an unstable salt). The acid, reacting with the nitrite, liberates nitrous acid, which then, acting upon the phenazone, forms an isonitroso compound of a green colour. With an equivalent of the alkaloid caffeine ($2\frac{1}{2}$ grains) this change does not take place, but a dispenser who used parchment-paper for wrapping the powders made with the alkaloid found that they did become green. This was owing to the parchment-paper being acid in reaction (it is made by steeping ordinary paper in sulphuric acid and water).

Boric Acid and sodium salicylate become pasty when mixed together, owing to the formation of sodium borosalicylate.

Crystals should be reduced to powder before they are dispensed as powders. In the case of quinine sulphate this is, unfortunately, not generally done; but every dispenser who gets a prescription for quinine powders fresh from the prescriber should take care to mark it 'Tere bene i.m.' for the benefit of subsequent dispensers.

Exalgin.—It was noticed that when the following were triturated in a mortar a valerianic-acid odour was developed:—

Exalgin.	.	.	.	.	.	.	gr. ij.
Phenacetin.	.	.	.	.	.	.	gr. iij.
Fiat pulvis. Mitte xij.							

There is nothing in either of these substances to give rise to valerianic acid. It was concluded that the materials had been crystallised from an amylic solvent.

Hydronaphthol in crystals is exceedingly irritating to raw surfaces, and it is difficult to reduce it by mortar and pestle to a sufficiently fine powder.

Hydronaphthol.	.	.	.	.	.	gr. xij.
Pulveris iridis	.	.	.	.	.	ʒj.
Zinci oxidi	.	.	.	.	.	ʒj.
Cimoliti	.	.	.	.	.	ʒij.
Pulverem amyli	.	.	.	.	.	ad ʒj.

Fiat pulvis aspersorius.

In this case the hydronaphthol was dissolved in a drachm of ether, and the solution poured upon the mixed powders contained in a warm mortar. The ether was quickly dissipated on stirring, and the powder proved satisfactory.

Hygroscopic Substances, such as acetate, carbonate, and citrate of potassium and iodide of sodium, ought not to be prescribed as powders, but if so each dose should be folded up in waxed paper, that again being covered with ordinary powder-paper. Do not attempt the reverse way. Granulated sodium citrate is now obtainable, and may safely be dispensed in powders wrapped in waxed paper. Calcium chloride is sometimes prescribed in powders. It should be powdered in a fairly hot mortar, and all the papers and the box dried in a warm place before use. Dispensed in this way the powders keep surprisingly well. Powder-boxes are a common source of damp owing to the paste used in their manufacture, and they should be well warmed before being used for powders with constituents possessing an affinity for moisture.

Iron Succinate.—This deliquescent salt has been ordered in cachets. Use the smallest possible amount of mucilage to make the cachet edges adhere.

Liquids.—It rarely happens that liquids are prescribed in

powders, but it may be well to note that a grain of white kieselguhr will absorb at least 1 minim of a liquid without becoming wet, and still be fit to dispense in waxed paper. The following peculiar prescription looks very like a slip on the part of the doctor :—

Cerii oxalatis	. . . . .	ʒiss.
Morphinæ bimeconatis	. . . . .	gr. iss.
Sodii bicarbonatis	. . . . .	ʒiss.
Mucilaginis tragacanthæ	. . . . .	ʒj.

Misce bene. Divide in pulveres xxiv.

Powders were obtained with compound tragacanth powder and the plain gum which would scarcely mix with water. So the dispenser tried the mucilage, mixing it with the powders, drying and reducing to powder, then adding the bimeconate, and was surprised to find that this powder mixed nicely with water. This may have been intended by the prescriber ; if so, he was clever and has originated a wrinkle which is worth remembering.

Mercurous Chloride.—A dispenser who had a prescription for 1-grain calomel powders was so struck with the minuteness of the portion that he added 2 grains of sugar of milk to make bulk. This is not considered justifiable, but it is open to consideration whether fractions of a grain of dense substances should not be made up as is the case with pills, and were such prescriptions more frequent than they are, the question would have been discussed and settled before now. Homœopathic powders are dispensed on this plan. A doctor prescribed the following with excellent results in infantile diarrhoea :—

Hydrargyri cum cretâ	. . . . .	gr. $\frac{1}{24}$
Sodii bicarbonatis	. . . . .	gr. $\frac{1}{8}$

Fiat pulvis. Mitte xxiv.

Sig. : One every hour.

There is nothing for it but to guess when dividing the powder, but it would be a boon to the dispenser and nurse alike if the bulk were made up to 24 or 30 grains before division. This is a case which recalls the old Scotchwoman's remark, ' Dinna be sae sparín' wi' it : it's for a mitherless bairn.'

Salts which may mutually decompose each other must be mixed in a perfectly dry condition, and should be stirred together lightly in the mortar. Instances are tartrate of potassium with sulphate of sodium, tartrate of potassium with chloride of ammonium, nitrate of potassium with salicylate of sodium. Effervescing lemonade-powder should be mixed by first rubbing together the tartaric acid with the sugar in a previously warmed mortar and then stirring in the bicarbonate of sodium very lightly. The powders should not be dried at a temperature above 30° C., or they are more liable to absorb moisture afterwards.

Squill and Ammoniacum in Powder keep perfectly in a bottle with an accurately fitting stopper, which should be wiped each time it is used, so that no particles are left between the stopper and neck. If the stoppering is not quite perfect, a little vaseline will make it airtight.

Powders for Lotions or other external purpose should be sent out in a different coloured paper from that used in other cases. A coloured paper is useful to distinguish at once between an internal and an external remedy. The powder should in all cases, however, be wrapped in waxed paper first, as the colouring of the paper may be altered by the powder. This would certainly be the case with the following:—

Zinci sulphatis	. . . . .	℥ss.
Plumbi acetatis	. . . . .	℥ij.

Misce et divide in pulveres xij.

When mixed, deliquescence takes place, owing to the water of crystallisation and consequent interaction of the salts. Therefore the salts must be separately dried before mixing, and wrapped in waxed paper, when the powders keep well.

Administering Powders.—It is the practice of many parents to give powders mixed with jam to children; there is no objection to this, provided the ingredients are compatible with the jam; but it should be borne in mind that many children's powders contain magnesia or bicarbonate of sodium, and the acid present in all jams would combine with and alter

the action of a portion of these ingredients. The simplest way to give a powder is to make a small draught of it with sugar and water. Treacle is sometimes recommended, but is objectionable in some cases owing to its alkalinity. These old remarks in regard to administration bring us to a topic which it was vain to write about thirty years ago, viz :—

CACHETS.

The late Mr. Henry Groves, of Florence, writing to *The Chemist and Druggist*, July 27, 1888, remarked :—

We have coated our pills and we are now thinking of starch shirts for our powders, in the wafers used for that purpose for so many years on the Continent. Until a few years ago people were content to wrap up the powder themselves, depositing it in the centre of a damped wafer and folding over the edges so as to form a sort of oyster, which, floated in a spoon with a little water, was as easily swallowed as the bivalve itself. Now, however, under the auspices of elegant pharmacy, the shirt is often put on by the pharmacist himself in the form of a 'cachet,' . . . the result being an elegant morsel which, moistened with water, is taken as in the old system.

Cachets were invented by Limousin, of Paris, in the early 'seventies, and many attempts were made to introduce them into this country up to the time Mr. Groves wrote ; but it was not until 1891, when the 'Morstadt' cachet-closing apparatus was offered, that the advantages of cachets began to be appreciated, and since then they have so grown in favour that no dispensing-counter is complete without a cachet-apparatus.



CLOSED CACHET.



HALF OF A KOSEAL.

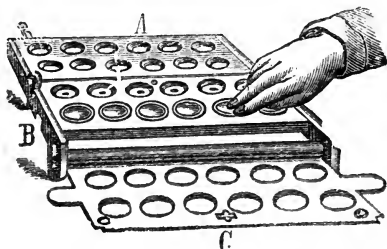


CLOSED KOSEAL.

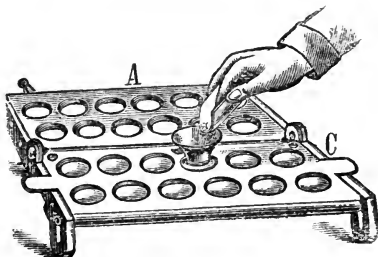
The one illustrated on page 177 is the 'Morstadt.' A cachet is made of two plate-shaped forms of rice-paper and when filled looks as shown in the first of the above figures. 'Koseal'

is the name given to a cachet with a raised rim, the advantage of which is that the edges do not get such a superfluity of moisture as to curl.

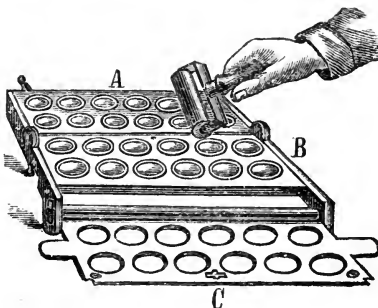
The first step in filling cachets is to place the halves in the holes of the apparatus. This is being done in the first of the annexed figures, B being the bedplate which holds those that are to receive the powder, A for those which will make the cover, and C covering-plate which is placed over B while the cachets are being filled with powder, in the manner shown in the second of the figures. This prevents the powder getting on the edge of the cachets. C is then lifted up as shown in the next figure and the lids moistened with a damp roller. A considerable nicety is required in damping cachets: too much moisture makes the edges curl, and if the moisture is insufficient the two halves will not adhere. A good plan is



PUTTING IN THE CACHETS.



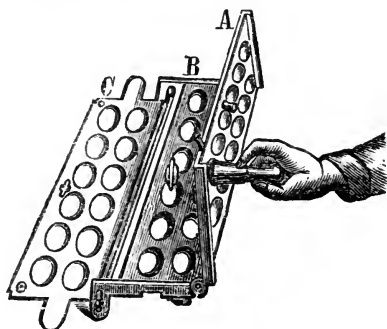
FILLING WITH POWDER.



MOISTENING THE LIDS.

to dip a piece of paper in water, drain it, shake off superfluous moisture two or three times vigorously, lay it upon the upper

halves of the cachets, press once with the roller, remove the paper, and quickly turn over the top of the machine and press steadily for a few seconds. Then remove the cachets as shown in the next illustration. If the damping of the rim be carefully performed, the edges need not get any moisture, and, in addition to not curling, they offer the advantage of becoming soft more quickly than the double edge of the cachet when moistened for swallowing.



PUSHING OUT THE FINISHED CACHETS.

Cachets are made of various sizes. It is the dispenser's duty to get a prescribed powder into as small a cachet as possible, and the way to do that is to rub the substance well in a mortar, the bulk being considerably reduced thereby. Some prescribers appear to regard cachets much in the same way as they do capsules, and order deliquescent substances—*e.g.*, glycerophosphates—to be put up in them. When that happens the dispenser must simply make the best of it; fortunately the cachets have a polished surface which excludes air well, and if they are dispensed in a layer of cotton-wool, a small number containing deliquescent substances keep fairly well for a few days.

SUPPOSITORIES, BOUGIES, AND PESSARIES.

DIOSCORIDES (A.D. 79), Galen (A.D. 131-200), and Avicenna (A.D. 980-1037) prescribed suppositories, and their prescriptions were still in vogue in the sixteenth century. Dioscorides also prescribed pessaries, which were more of the nature of tampons than soluble medicated pessaries. (See *The Chemist and Druggist*, 1891, II. 385.) Suppositories and pessaries in those early days were made with such vehicles or excipients as (1) oils and fats, (2) gums and resins, and (3) honey. Suppositories frequently encased a piece of soft, old linen, which enabled the undissolved mass to be withdrawn. These now have their equivalent in the linted suppository and the Watson-Cheyne bougie. All these forms of medication dropped out of use, at least in good practice, during the eighteenth century. Pereira mentions suppositories (1849) in the following terms :—

When the substances applied to the rectum are solid, we name them *suppositories* (*suppositoria*, from *suppono*, to put under). Formerly *suppositories* were conical, or cylindrical, like a candle, and of variable size—sometimes one or two inches long. They are now usually made globular and of small size. They are employed to evacuate the bowels; to irrigate the rectum . . . but more commonly to act as local agents in affections of the rectum, bladder, uterus, prostate gland, urethra, &c.

This is interesting in view of the fact that the decade 1840-50 saw the renaissance of the suppository, and that Pereira includes the bougie and pessary in the title. It was in 1840 that Dr. Osborne, a leading English practitioner, wrote about the value of suppositories in the *London Medical*

Gazette. A few years later Sir James Y. Simpson began to prescribe pessaries, using a wax-and-lard basis ; he published particulars in 1848. In 1850 Mr. A. B. Taylor, of Philadelphia, suggested cocoa-butter (*oleum theobromatis*) as a basis, and this has now become the most commonly employed fat for suppositories and pessaries. The various editions of the British Pharmacopœia fairly reflect the progress of ideas in regard to the bases in use at the respective dates, but it is right to add that the earlier pharmacopœial formulæ were considered to be behind date.

SUPPOSITORIA MORPHIÆ
1864.

Hydrochlorate of morphia	3 gr.
Sugar	30 gr.
White wax	30 gr.
Lard	30 gr.

SUPPOSITORIA ACIDI TANNICI
1864.

Tannic acid	24 gr.
Glycerine	20 min.
White wax	40 gr.
Lard	80 gr.

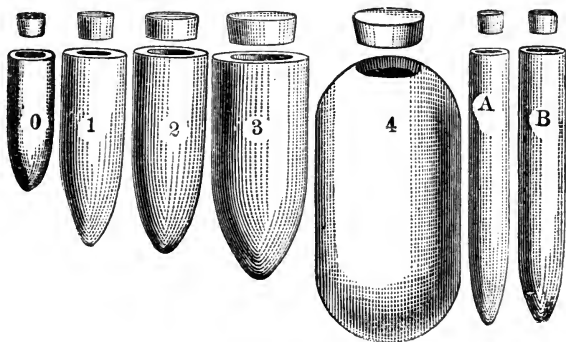
Each of these was for twelve suppositories, and the mass was divided, solidified, and formed into cones each of which was dipped in a melted mixture of white wax 3 parts and lard 8 parts. This coating was abolished in the 1867 edition, and the mass made of benzoated lard 64 grains, white wax 20 grains, and oil of theobroma 90 grains for morphine suppositories. This was very good indeed as a basis, because one melted the wax and cocoa-butter together, mixed the medicament with the lard, and added the mixture to the melted portion, when a mass just fit for pouring was obtained. However, cocoa-butter alone was preferred generally, and the 1867 form was omitted in 1885. The Addendum to the 1867 B.P. recognised an old-fashioned formula, which was continued in the 1885, but was dropped in the 1898, edition. It was as follows, in the case of tannin :—

	1874.	1885.
Tannic acid	36 gr.	36 gr.
Glycerine of starch	50 gr.	30 gr.
Curd soap	100 gr.	100 gr.
Starch	a sufficiency	a sufficiency

For twelve suppositories.

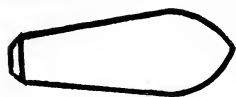
This was an unsuccessful attempt to prepare suppositories in the cold way. A gelatin basis was introduced into the 1898 Pharmacopœia as a vehicle for glycerin, and the principle of adjusting the melting-point by the addition of white wax to cocoa-butter was recognised in the case of phenol suppositories. The United States Pharmacopœia basis is cocoa-butter; no formulæ are given, but it is recommended that suppositories should be made to weigh 1 gramme, pessaries 3 grammes, and urethral bougies 1 gramme.

The Shapes of suppositories, pessaries, and bougies conform more or less to that of a rifle-bullet. They are represented in the subjoined illustrations of hollow suppositories.



No. 0 is for children, and can also be used for the ear or nose. Nos. 1, 2, and 3 are for the rectum, the last being the size generally adopted for nutrient suppositories and for most pessaries (3j.); No. 4 is a pessary (3ij.); and A and B are the shapes and sizes for nasal bougies. Bougies vary in diameter from $\frac{1}{12}$ to $\frac{1}{6}$ inch, and are from $2\frac{1}{2}$ to $6\frac{1}{2}$ inches in length—a bougie $2\frac{1}{2}$ inches long and $\frac{1}{8}$ inch in diameter weighs about 15 grains. The common size for urethral bougies is 4 inches long and $\frac{1}{8}$ inch in diameter. Suppositories are usually 15 grains in weight—that is, they fill the same space as 15 grains of water—and are 1 inch long and

$\frac{1}{4}$ inch in diameter. Pessaries are now made oval as well as cylindrical, and rarely more than 1 drachm in weight. An



WELLCOME SHAPE.

improved shape for bougies and suppositories, consisting of a long and short cone, was suggested by Dr. Samuel G. Dixon, of Philadelphia, in 1888. Mr. Henry S. Wellcome, in a communication to the American Pharmaceutical Association in 1893, suggested a form as here indicated, now known as the 'Wellcome' shape, or 'enule.'

The Size of the official suppository was at one time vague, as the British Pharmacopœia weight was in each case 15 grains, independent of the specific gravity of the mass. In January, 1896, *The Chemist and Druggist* asked the opinions of several representative pharmacists (Messrs. Peter Boa, A. W. Gerrard, W. Martindale, C. Symes, and Walter Hills) on the question, Should the bulk of a suppository be made up to that of 15 grains of water? They unanimously replied in the affirmative. The 1914 Pharmacopœia prescribes the bulk to be made up to 1 gramme. The capacity of the moulds varies about a grain on either side of a 15-grain (1-gramme) mould. It is advisable to check the capacity of any new mould by wiping the interior with an oiled cloth, filling with melted cocoa-butter, and after the fat has hardened by cooling, trimming the tops and weighing each suppository. If the discrepancy is not more than a grain either way the mould may safely be used, as approximate accuracy is all that is expected in dispensing. Should the mould hold more than 15 grains of cocoa-butter, an additional quantity of the basis will be required in dispensing: it is customary to take ingredients as thirteen to the dozen to allow for waste. The capacity of the mould for other bases—*e.g.*, gelatin—should also be determined.

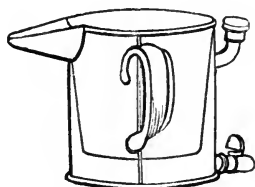
METHODS OF PREPARATION.

Suppositories are made either by pouring the liquefied mass into a suitable mould or by pressing a powdered mixture of the ingredients into the mould (cold method). In the

former way it is not advisable to melt the basis by the direct heat of a spirit-lamp or Bunsen burner, the temperature of a

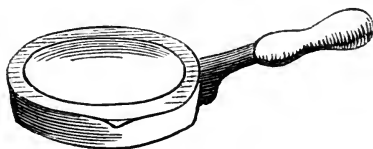


EARTHENWARE CASSEROLE.

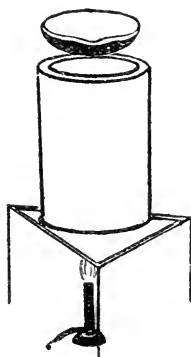


LEAROYD'S SUPPOSITORY-PAN.

water-bath sufficing and being safer. An earthenware casserole is the simplest dish to use for melting the basis; this may be heated over a flame if asbestos mill-board is placed between the two, but better over a simple water-bath, such as the one figured below, which is made of copper, the outside diameter being 4 inches, the depth $1\frac{1}{2}$ inch, and the rim $\frac{1}{2}$ inch wide. Learoyd's suppository-pan is a water-bath, but is more adapted for the manufacturing scale than for the dispensing-counter. The extemporised arrangement figured here consists of a 1-lb. vaseline tin, supported by a tripod. An ordinary

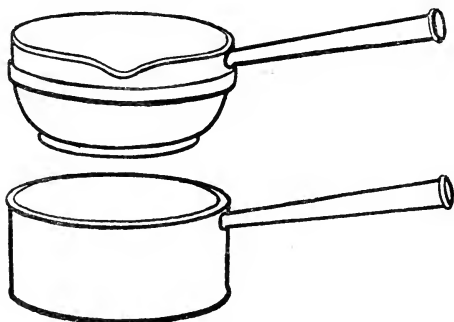


COPPER WATER-BATH.

EXTEMPORISED
WATER-BATH.

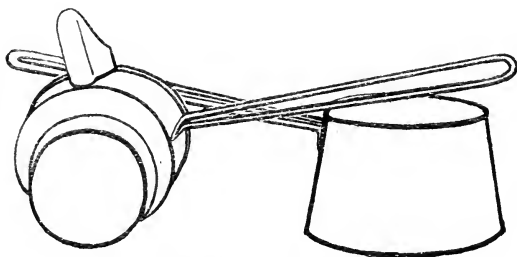
porcelain evaporating-dish is used for melting the fat, but a casserole may also be employed. Another method of using the casserole is shown in the next figure. This consists of a casserole (or evaporating-dish to which a handle is secured) with a tin rim to support the dish when it is put into the

tin pan containing the water. An improvement upon this is the Martindale suppository-pan, made entirely of tinplate.



CASSEROLE WATER-BATH.

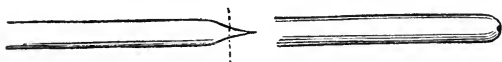
The pan on the right is the water-bath, which is $1\frac{1}{2}$ inch deep, 2 inches diameter at the bottom, and $1\frac{3}{8}$ inch at the top. The handle is $3\frac{1}{2}$ inches long. Half an ounce of water is all that is needed for this pan. The lipped pan for holding the suppository-basis is $1\frac{1}{2}$ inch deep, 2 inches diameter at



MARTINDALE SUPPOSITORY-PAN.

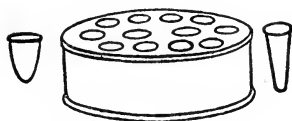
the top, and $1\frac{1}{2}$ inch at the bottom. The spout of the pan is $\frac{3}{4}$ inch wide where it joins the pan, $\frac{1}{4}$ inch deep, and it narrows to $\frac{1}{4}$ inch, so that it is easy to fill the mould—in fact, this is a perfect suppository-pan for the dispensing-counter. (See *The Chemist and Druggist*, 1892, II. 273.)

The Mould is the next requisite in suppository-making. Metal moulds are the best, but it is a good pharmaceutical accomplishment to be able to make a mould of any size when wanted. The French do that by twisting paper into cones (as in making a paper bag), and sticking each cone into a box of linseed meal. Another way is to make some suppositories of white wax ; then take a box of suitable size, about 1 inch deep, and nearly fill it with plaster of Paris, made very thin with water. Next place the wax suppositories at equal distances apart along one side of the box, leaving them half above the plaster ; allow to set hard, and oil the surface of the plaster well. Now raise the sides of the box by rolling brown paper round it, then pour in more plaster. After the plaster has properly set separate the parts, trim them up with a knife, and boil for at least half an hour in linseed oil to toughen them. In trimming the edges of the mould two notches should be made on each side so as to fix them properly when the mould is required. After casting and cooling the suppositories the top half is lifted off first, and the suppositories pushed out from the bottom. Another plan, as in making bougie-moulds, is carefully to wrap tinfoil round an elastic bougie, and place the foil with its mould in a box of chalk. As the elastic bougie is of the same thickness nearly all its length, there is considerable difficulty in drawing off the mould from the model, and the sides of the mould are drawn together. This trouble may be obviated by using a piece of glass tubing the size of a No. 8 bougie. First draw out the end to a point and cut it off about $\frac{1}{8}$ inch from where the narrowing begins, then fuse again until the end is rounded off as the bougie is to



be, taking care not to allow the aperture to close. This tube now forms the model upon which to shape the tinfoil moulds. The tinfoil slips more easily from the glass than from elastic gum, and the little hole at the apex allows air to enter as the

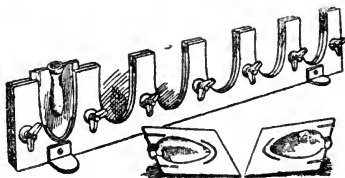
tube is withdrawn. The late Dr. H. Bowman Brady had a gunmetal mould made for him in 1865, but it is claimed that Chapman, a Cincinnati pharmacist, made one in 1854. Brady's mould is shown on page 189. It is made in two pieces, which are hinged together at the base. This is the form now generally in use. An American style consists of a circular metal box pierced with holes into which thimbles fit (see illustration). The box can be filled with iced water or a



PARRISH'S MOULD.

freezing-mixture. The thimbles are filled with the suppository-mixture, dropped into the box, and owing to the chill the contents of the mould contract, and are easily tapped out when solid.

A much better idea is the 'Cygnet' mould, in which the mould consists of two nickelled metal plates so formed that each is the mould for half a suppository, and two together make the whole. The pair (or as many pairs as are required) are fitted into a holder as shown in the illustration. The whole apparatus is made to rest upon a tin bath which can be filled with water or ice and water to chill the suppositories. The moulds are made in several shapes; two are illustrated, one of them being pear-shaped. An excellent idea was once put forward in *The Chemist*



'CYGNET' MOULD
WITH REMOVABLE MATRICES.

and Druggist for modifying the Brady mould—viz., to keep it the same diameter as for a 15-grain suppository, but to double its length. The mould thus becomes a nasal-bougie mould but can be used for any smaller size of suppository.

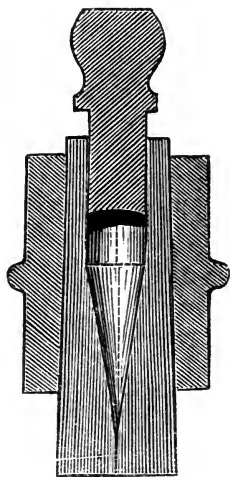
The Cold Method of suppository-moulding is one of pressure. The old-fashioned or French mould is formed of two hollowed-out pieces of metal or hard wood, wedge-

shaped externally, so as to fit into a stout ring. The weighed quantity of material is pressed well into the mould by means of the stopper, as shown.

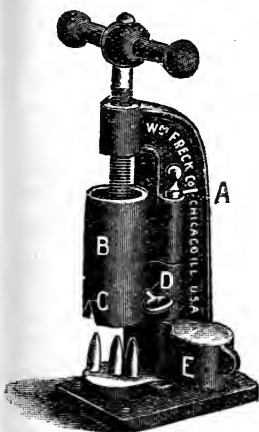
Much more elaborate apparatus is now obtainable for cold moulding. In this case the medicament is powdered and mixed well in a mortar with shredded or granulated cocoa-butter (which can be bought in the granulated state). The mass is placed in the cylinder of the machine, B, to the bottom of which a circular mould is attached; by screwing the lever the mass is pressed into the holes of the mould. By removal of the bedplate E and giving the screw a turn, the finished suppositories are pressed out of the mould. The apparatus illustrated is

one of several on the market.

Bougies are made in these machines by attaching to the base of the cylinder a plate in which there is a circular orifice about $\frac{1}{8}$ inch diameter. On turning the lever the mass comes out through this orifice as a pipe, and is cut into the requisite lengths. If the dispenser cannot get such special apparatus, suppositories can be made by cold compression thus: insert a brass screw-nail (with head of less diameter than an ordinary metal suppository-mould) in an awl-handle; also take two pieces of card the length of the suppository-mould, and bend back at the level of the mould to an angle of 45° ; put a piece each side of the mould, and protect the ends similarly.



FRENCH MOULD.



'FRECK' SUPPOSITORY-MOULDER.

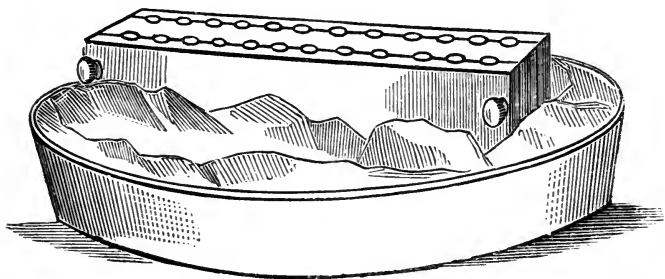
Tie round with string, put the powdered mass into this trough, and fill each of the holes by pressing with the screw-nail compressor. The ordinary mould-lubricants should be used.

The Cocoa-butter Basis is used when none is specially indicated on the prescription. The following is the *modus operandi* for the hot method :—Weigh the basis (using at least 16 grains for a 15-grain suppository), and melt as already indicated ; then, if the prescribed medicament allow, it should be finely powdered, and rubbed down with a little of the melted basis to a creamy consistence on a pill-tile which has been made nearly as warm as the hand ; transfer this mixture while still creamy to the suppository-pan, stir until it begins to thicken, then pour into the mould. If an aqueous extract is an ingredient, proceed as follows :—Melt the cocoa-butter, and keep on the water-bath until required (it must be kept at a temperature just over its melting-point) ; rub the aqueous extract and other medicament with a little water on a cold pill-tile to creamy consistence, transfer to an ointment-slab (which has been warmed in water to the body temperature), pour a little of the melted basis upon the medicament, and stir until it begins to thicken ; manipulate rapidly and vigorously as an ointment, gradually adding the whole of the melted basis, so as to produce a perfectly uniform preparation before it becomes harder than a soft ointment ; quickly transfer the whole to the dish, and warm cautiously, stirring continuously, until it is just fluid enough to pour into the mould. Tannic acid, or any other incompatible, must not be mixed with the aqueous extract: it should be separately rubbed down with a little of the melted basis on a slightly-warmed slab, and added just before pouring into the mould. Some dispensers use a quinine-bottle for melting the basis by putting it into a pan of hot water. This receptacle has the advantage of being easily shaken so that the contents can be well mixed.

To get the proper quantity of mass into the mould when it is to be partly filled, have a small sewing-thimble of the

requisite capacity, soldered to a bit of wire as a handle, and use the thimble as a ladle for the melted mass.

A well-made suppository will slip readily from the mould, it has a perfectly uniform appearance throughout, and a fine polished surface. To secure this result, careful attention must be paid to the lubrication of the mould and to the method of pouring. If the mould be cold, and its surface highly polished and quite free from grease, no lubricant is needed, or perhaps the inner surface may be breathed upon just before filling; in either case, the mould should not be opened until plenty of



MOULD COOLING ON ICE.

time has been allowed for the suppositories to become thoroughly hard. When this involves too much delay, the mould should be wiped with a piece of lint dipped in olive oil, or it may be coated slightly with a mixture of soap liniment (1 part) and glycerin (2 parts), or a solution of soft soap 1 drachm in an ounce of weak spirit. Too much soap in the lubricant emulsifies the surface of the suppository, and gives it a whitened and uneven appearance; too little prevents the glycerin from remaining thinly distributed—then the suppositories adhere to the mould, and may break in extracting. The melted suppository-mixture should be poured into the mould just as it is beginning to solidify; if too hot, any medicament not in solution may subside and accumulate at the apex of the

suppository. In very hot weather it will be found necessary to put the filled mould on the floor of a cold cellar for half an hour to cool ; but it is usual, when suppositories are urgently required, to place the mould on a plate and surround it with lumps of ice, as shown on page 189. Never put the mould under water until after the suppositories have set.

If expeditiously and properly done, the suppositories, when cool, should slip from the mould without the least trouble, having a beautiful polished finish, and, what is more important still, having a uniform composition and structure, and not with the active medicinal agent all concentrated at the apex, as is always the case when the heat applied has been excessive. The principal secret of making suppositories is to avoid heating the basis much beyond its melting-point and to keep it over the heat as short a time as possible. A thermometer to indicate the temperature of the water in the bath prevents a lot of worry. If a batch of basis—say, cocoa-butter—be accidentally overheated, it is well to put it aside and begin with a new piece. The overheated material regains its normal character as to solidification in about two days, when it can satisfactorily be used.

The Melting-point of cocoa-butter (about 93° F.) is lower than the normal temperature of the human body (98° F.), and the fat is in consequence considered to be an ideal basis for suppositories, but it is customary during the summer months and in warm countries to add from 1 to 3 grains of white wax to each 15-grain suppository in order to keep the mass firm ; the addition does not imperil the therapeutic efficacy of the suppositories. Dispensers should, however, keep the fact in mind that some medicaments raise the melting-point of cocoa-butter, either by chemical action upon it or by retarding fusion. This matter was investigated by Mr. T. Maltby Clague (*The Chemist and Druggist*, 1891, I. 800), and his results are well worth quoting. In 1890 a correspondent submitted suppositories prepared according to the following prescription, with the complaint that they remained solid in the rectum :—

Ferri pernitratiss	gr. xij.
Morphinæ muriatis	gr. j.
Olei theobromatis	q.s.

Misce et divide in suppositoria sex.

We found the melting-point of the suppositories to be 113° F., so that it had increased by at least 18° F. Mr. Clague, taking the matter up, compounded several suppository-masses, kept them under observation, and noted that with the ingredients mentioned below the melting-points were raised as stated :—

Ferric nitrate (10 per cent.)	raised the melting-point 18° F.
“ “ “ mixed cold and allowed to stand six months	raised the melting-point 8° F.
Ferric chloride (10 per cent.)	“ “ “ 13° F.
Nitric acid (10 per cent.)	“ “ “ 28° F.
Silver nitrate (0.3 per cent.), after two years	“ “ “ 17° F.
Bismuth oxide, after two years	“ “ “ 17° F.
Lead acetate (5 per cent.)	“ “ “ 10° F.
Lead carbonate (20 per cent.)	“ “ “ 12° F.
Tannic acid (20 per cent.)	“ “ “ 13° F.
Zinc oxide (25 per cent.)	“ “ “ 14° F.

There seems no doubt that the rise in melting-point is due in these cases to interaction between the substances and the fat, metallic salts of the fatty acid being formed in some cases. Mr. Clague proved this with the bismuth, lead, and zinc suppositories, while the ferric salts doubtless raised the melting-point through the influence of their acid radicles. Probably owing to the publication of Mr. Clague's observations, such combinations are now rarely seen in practice. One may tell quickly whether a suppository will melt or not by placing a small piece of it in the mouth ; should it remain hard, a little oil or lard must be added to the mass.

OTHER FATTY MEDIA.

The late W. Martindale spoke highly of a mixture of equal parts of stearic and oleic acids as a substitute for cocoa-butter ; the advantages which he claimed for it are that—

(1) The mixture has a very low fusing-point, and readily melts at the temperature of the body.

(2) The suppositories leave the mould without difficulty.

(3) It has the advantage, besides being a solvent of such alkaloids as pure morphine, atropine, cocaine, &c., of being, at least as far as the oleic acid is concerned, readily absorbed by the skin and mucous membrane.

(4) On account of the partial crystallisation of some of the stearic acid, the suppositories are firm, and can be placed in their position without difficulty, not being elastic, brittle, or yielding in any way.

(5) The proportions of stearic and oleic acids can be varied to suit the temperature of summer or winter, and also the other ingredients prescribed with them.

These opinions were expressed many years ago, but cocoa-butter has maintained its pre-eminence, which it deserves. It is very uniform, bland, keeps well, and has an agreeable odour. The others vary in melting-point and require to be watched in this respect; they incline also to develop a peculiar odour without much provocation: they are most suitable for use on the large scale by experts, and they work out rightly on the score of economy. Coco-nut stearin is better than ordinary stearin or than Mr. Martindale's mixture. It was long ago recommended by Dr. Bowman Brady, and Squire speaks well of it. Mr. C. J. S. Thompson finds a mixture of 4 ounces of the stearin and 340 grains of white wax suitable. A mixture of anhydrous wool-fat (3 parts) and hard paraffin (1 part) is excellent for fluids and extracts. For extracts and liquids Lucas recommends cocoa-butter 99 and anhydrous wool-fat 1.

The Gelatin Basis.—Although sometimes employed in making pessaries, this basis is generally considered to be not nice for these, as the gelatin mats the pubic hairs, and the only advantage which the basis possesses over cocoa-butter is the contained glycerin—frequently a valuable therapeutic agent in uterine troubles. The basis is much used for nasal bougies. The following are recommended formulæ:—

EX-THROAT HOSPITAL.

Gelatin	5 oz.
Glycerin	6 oz.
Water	6 oz.

All by weight.

Soak the gelatin in the water for twelve hours, add the glycerin, dissolve on a water-bath, and evaporate until the mass weighs 15 oz.

SQUIRE'S.

Gelatin	1 oz.
Water	1 oz.
Glycerin	3½ fl. oz.

Soak the gelatin in the water until absorbed, add the glycerin, and dissolve by the heat of a water-bath.

The B.P. formula for suppos. glycerin. is substantially Squire's, but the directions are not so good as Squire's. The finest French gelatin, in thin, almost colourless sheets, should be used. One mass is not universally applicable, medicaments acting upon it in diverse ways. Ochse gives the following hints as to the use of gelatin bases :—

Where gelatin suppositories are frequently dispensed it is best to have a definite mass in stock. This is made in large or small quantities, according to the requirements of the pharmacist. After removing the scum from the solution the latter is poured into bottles, and when thoroughly cooled covered with alcohol to prevent it from becoming mouldy. When wanted for use the alcohol is drained off, the bottle placed in a water-bath, and the required quantity poured off. The mass is made as follows : The accurately weighed gelatin is allowed to macerate overnight in distilled water, and drained on a sieve. The gelatin adhering to the sieve is collected, the whole placed in a tared porcelain dish, and sufficient water added to make the weight four or five times as much as the original quantity of gelatin used. The dish is placed on the upper ring of a retort-stand and heated over wire gauze with a gas or spirit-lamp flame, care being taken not to burn the gelatin. The glycerin is added (in all the subjoined formulæ the parts are to be by weight) and the whole evaporated to the consistency required, viz. :—

I. Gelatin 20 parts, water 80 parts, glycerin 40 parts ; evaporated to 60 parts. Intended for preparations kept in stock and for those which are to retain their transparency.

II. Gelatin 10 parts, water 40 parts, glycerin 15 parts ; evaporated to 25 parts. For hygroscopic drugs, for bougies of perchloride of iron (made by dissolving 1 part of ferric chloride in 9 parts of water, and adding to 19 parts of the mass), for tannin suppositories (0·2 per cent.—but this recommendation is opposed to theory), and for vaginal pessaries containing iodide or bromide of potassium, bromide, chloride, or salicylate of sodium, and ergotin. Chloral-hydrate suppositories are made with this mass, the hydrate being dissolved in as little water as possible.

III. Gelatin 10 parts, water 40 parts, glycerin 20 parts ; evaporated to 50 parts. For suppositories generally, also in special cases, as for carbolic acid (and similar medicaments soluble in a small quantity of alcohol), which are made by adding 3 parts of carbolic acid, previously dissolved in alcohol, to 7 parts of glycerin and 50 parts of this mass. To make alum bougies, liquefy 25 parts of the mass and 10 parts of distilled water on a water-bath. To this add a *hot* solution of 7 parts alum, 10 parts glycerin, and 5 parts distilled water. The whole is then evaporated with gentle stirring to 35 parts. The mixture becomes thick and turbid on adding the solution of alum, but, on heating over a water-bath and stirring carefully, it soon becomes clear and transparent.

IV. Gelatin 10 parts, water 40 parts, glycerin 30 parts ; evaporated to 60 parts. This mass is used for certain vaginal pessaries, and for urethral bougies, especially those containing sulphate of zinc, sulphate of copper, nitrate of silver, extract of opium, hydrochloride of morphine, and bichloride of mercury. One part of any of them is dissolved in a little water, and then added to 99 parts of mass and poured into moulds. If it is desired to make a large quantity of sulphate of copper bougies, it is best to mix not more than the mould will hold at a time, because by frequently heating the mass the bougies acquire a yellowish-green instead of a blue-green colour.

V. Gelatin 30 parts, water 120 parts, glycerin 15 parts ; evaporated to 104 parts. Used for bougies containing a large percentage of powdered drugs insoluble in water or alcohol. Thus 50-per-cent. bougies of iodoform are made by adding 27 parts of powdered iodoform to 54 parts of mass. When taken from the mould the bougies are placed in a drying-closet until they weigh about two-thirds of their original weight.

The quantities of medicaments indicated may, of course, be modified. Those given serve to show how the active ingredients are added.

In making suppositories with the gelatin basis, the mould should be cold, clean, and quite dry ; then thinly coated inside with almond oil. When turned out the suppositories

should be wiped with a dry cloth in order to remove the oil, or placed for this purpose on a sheet of filtering-paper. A mortar or slab is not convenient to use with this basis, which is simply melted in a dish, and the medicament stirred in until thoroughly dissolved or diffused. The gelatin basis is well adapted for the exhibition of alkaloids and aqueous extracts, but not for tannin, carbolic acid, or bromide and iodide of potassium.

HINTS FOR SPECIAL CASES.

The following paragraphs deal with substances which either do not 'go' according to rule, or which illustrate principles that may be adopted with similar substances.

Anusol.—The name of a proprietary pile-remedy. The following semi-official German imitation is from *The Chemist and Druggist Diary*, 1914:—

Bismuth oxyiodide	I gramme
Bismuth subgallate	I gramme
Zinc oxide	I gramme
Resorcin	0·1 gramme
Peruvian balsam	0·5 gramme
Oil of theobroma	26·4 grammes

Make into suppositories weighing 3 grammes each.

Aristol (described later) is sometimes prescribed in bougies for nasal affections and for urethral discharges. It decomposes readily on the application of heat. A prescription ordering 10 grains in a bougie, when compounded with 12 grains of cocoa-butter, gave a tough indiarubber-like mass by the hot method, a better one with 10 grains of cocoa-butter and 3 grains of spermaceti ointment; but the bougie is best made by the cold method, using cocoa-butter alone.

Balsam of Peru has now regained its ancient favour as an antiseptic. The following is a typical prescription for it:—

Balsami peruviani	gr. x.
Iodoformi	gr. v.
Oleum theobromatis.	ad ʒj.

Fiât pessus. Mitte tales duodecim.

The balsam makes the mass much too soft if cocoa-butter alone is used. It mixes easily with the fat, and that may tempt the dispenser to add it to the dish, which should not be done. The best plan of compounding is : Take 540 grains of cocoa-butter and 60 grains of white wax, shred, and melt on the water-bath. Mix the iodoform (subtilissimum) on a slab with the balsam, then add about a third of the melted basis, mix well, add a little more basis, again mix, and transfer to the dish, stirring all the time, then pour into the mould.

Boric Acid makes the cocoa-butter basis crumbly, and when compounded by the hot method the mould should be well lubricated with soft-soap lubricant (1 in 10 of water). The best suppository of boric acid is made with glycerinum acidi borici B.P. and gelatin on Squire's plan (page 192).

Bougies may also be made in the following manner : Glass tubing of suitable calibre is cut into convenient lengths, and the melted mass drawn into it by attaching a piece of indiarubber tubing to one end, and sucking the mass up. The mass solidifies in a few minutes, and is then pushed out with a piece of iron wire of sufficient thickness to go into the tube like a piston. Care should be taken that bougies are not made too hard. It is inadvisable to add wax to cocoa-butter in this case, but a mixture of cocoa-butter 2 parts, lanoline 1 part, and white wax 1 part, gives a tough mass which melts at the body-temperature, and is better than cocoa-butter alone. Mr. A. W. Gerrard described this method to the British Pharmaceutical Conference in 1906, but it had previously been given in several editions of this book.

Chloral Hydrate behaves with cocoa-butter much in the same way as it does with camphor, especially when heated. A mass containing 60 per cent. of chloral hydrate may be made as follows : Into a small wide-mouth bottle put 1 drachm of shredded white wax, and melt on a water-bath ; then add 3 drachms of powdered chloral hydrate, shake well, and add 1 drachm of cocoa-butter previously melted. Continue to shake until creamy, then mould. Cocoa-butter alone may be used by the cold method along with powdered chloral hydrate.

The following illustrate other methods :—

I.

Chloral hydrat.	.	.	gr. v.
Ext. cannab. ind.	.	.	gr. j.
Ol. theobrom.	.	.	q.s.

Fiat suppositorium.

Melt the cocoa-butter and pour into a well-lubricated and iced mould. Allow to stand for a minute so that the outer layer of fat becomes quite hard, and the inner remains liquid, then invert the mould to allow the liquid fat to flow out. Trim the hollow suppositories and put into each the doses of chloral hydrate and extract previously mixed, then fill up with melted cocoa-butter.

II.

Chloral hydrate	.	.	2 parts
Oleic acid	.	.	1 part
Stearin	.	.	3 parts

Melt the stearin on a water-bath and add the oleic acid, mix ; next add the powdered chloral hydrate, stir until dissolved, and just before the mass begins to set pour it into an iced mould previously well lubricated with spirituous solution of curd soap.

No. I. method is an ingenious way, suggested by Mr. A. H. Morgan, of getting over the difficulty which frequently arises of mixing certain things with the basis. It is really an extemporaneous method of making hollow suppositories.

Cocaine.—If the pure alkaloid is prescribed alone in suppositories it should be dissolved in the melted cocoa-butter (solubility 1 in 12). Medical men sometimes forget to add 'hydrochlor.' or 'mur.' in prescribing cocaine suppositories and pessaries (the latter are much used for vaginitis), and many dispensers hold that in this case the pure alkaloid should be used and dissolved as stated. It has been proved, however, that the finely powdered hydrochloride gives a more efficacious suppository, as it is absorbed directly it touches the mucous membrane, while it is doubtful if the moist surface extracts the alkaloid from fatty solution. This is supported by the statement, on high medical authority, that 'carbolic oil is worthless as a disinfectant ; it does not liberate the carbolic acid to moist surfaces.' The hydrochloride and other substances easily soluble in water may be dissolved on the slab with an equal quantity of water, and then thoroughly

mixed with the suppository-basis ; but when other medicaments are prescribed along with the salt, which may involve chemical decomposition, it is better not to use water. Powder the ingredients finely, and rub separately with a little of the melted fat before finally mixing together.

Ergotin presents little difficulty when the dose is 3 grains or under, but 5-grain suppositories are not uncommon, and we have seen as much as 8 grains prescribed. With cocoa-butter the procedure is the same as with extracts, a little wax being added to the cocoa-butter, and care being taken to incorporate the ergotin with half of the melted fat. An excellent suppository is made with the gelatin basis, the ergotin being thinned, if necessary, with a little water and added to the melted basis.

Extract of Belladonna.—Liquid alcoholic extract of the root is prescribed by the British Pharmacopœia for suppositoria belladonnæ. The liquid extract may be used in the proportion of 4 minims for 3 grains of dry extract.

Extracts.—It suffices in the case of most extracts to rub the prescribed quantity to thinness on a slab with a little liquid appropriate to the extract (water or proof spirit) ; then add as much of the melted basis, mix, and so on until half the basis is used, return to the dish, mix well, and pour into the mould.

We have never had any difficulty with even large quantities of green extracts by taking care to soften the extracts with water, and to mix them intimately with the melted, but not too hot, fat, as in the following case :—

Ext. belladonnæ virid. (B.P. 1898) .	.	.	gr. v.
Potassii bromid. . . . .	.	.	gr. x.
Ol. theobrom. . . . .	.	.	q.s.

Fiat suppos. Mitte vj.

Powder the bromide as finely as possible, and place it on a slab ; rub down the extract on the slab with 3 to 5 drops of water. Melt 50 grains of cocoa-butter and 5 grains of white wax over a water-bath, and rub up more than one-half of it with the medicaments on the slab. Then transfer to the dish

containing the rest of the basis, mix expertly, slightly heating if necessary, and pour into the mould.

The following prescription would be a simple one to compound were it not for the presence of the tannin, so that it is inadvisable to melt the basis :—

Ext. bellad. virid. (B.P. 1898)	.	.	.	gr. iij.
Plumb. acet.	.	.	.	gr. ij.
Ac. tannic.	.	.	.	gr. iv.
Ol. theobrom.	.	.	q.s. ut ft. suppos.	gr. xv.

Mitte vj.

The simplest method of dispensing these is to take 54 grains of cocoa-butter for the six suppositories and shave it into shreds; soften the extract in a warm mortar with a few drops of water, mix the butter intimately with this, add the tannin and the lead acetate, each in fine powder, and work up like a pill-mass; weigh out each suppository and press into the mould.

We quote the following on account of the large dose of extract of opium, rather than for any inherent difficulty which it presents :—

Ext. opii	.	.	.	.	gr. iij.
Ext. belladonnæ	.	.	.	.	gr. j.
Ol. theobromatis	.	.	.	.	gr. xx.

Fiat suppos.

It is advisable in this case to use 18 grains of cocoa-butter and 2 grains of white wax (which in all such cases is beneficial). Rub down the extracts in a mortar with sufficient water to make a smooth soft paste; add half of the fatty matter to this gradually, so that a perfect mixture may be obtained. Then transfer it to the dish, and dissolve in the remainder of the fat, aiding the process by the heat of a water-bath if necessary. In making masses for above two dozen suppositories a 1-ounce quinine-bottle is excellent for melting the basis and mixing, a pan of hot water being used as the water-bath.

Galls.—The powder of galls, like tannin, cakes easily in melted cocoa-butter, especially if the latter exceeds 130° F. in

temperature. Dispensers should learn to melt the fat so that it is not much above 100° when all is melted, which is easily done by shredding the butter fine or using the powdered article. In the following case it is impossible to use water with the extract, as it helps to cake the powdered galls :—

Pulveris gallæ	gr. xx.
Extracti belladonnæ viridis	gr. iij.
Olei theobromatis	q.s.

Ut fiant suppositoria sex.

The best plan with this is to beat all the ingredients together in a warm mortar until a uniform mass is produced, and mould in the cold way ; or warm gently to 110° F., stirring all the time, and pour into the moulds.

Glycerin.—For rectal purposes the British Pharmacopœia glycerin suppository-mass is best, but for pessaries either of the following is better :—

I.	
Stearin soap	1 part
Glycerin	19 parts

Dissolve the soap in the glycerin by the aid of heat and pour into moulds. (Glycerin by weight.)

II.	
Stearic acid	75 gr.
Sodium carbonate	45 gr.
Glycerin (by weight)	15 dr.

Dissolve the carbonate in the glycerin on a water-bath, add the acid, stir until effervescence ceases, and pour into moulds.

The second is the United States Pharmacopœia formula. Both are substantially the same in result, and the finished suppositories or pessaries have to be wrapped in tinfoil. For rectal use objection is taken to the stearate form on the ground that, owing to their high percentage of glycerin, they produce tenesmus. Agar-agar (Japanese isinglass) has been recommended in place of gelatin. A good mass is made by soaking 1 part of agar-agar in 5 parts of water, adding 25 parts of glycerin, and dissolving.

Hamamelis Suppositories.—These may be made with the liquid extract of the leaves—5 minims in each suppository, evaporated to one-half its bulk, with a cocoa-butter basis. The following is a rare prescription which illustrates the power of fats to take up liquids by gentle coaxing :—

Morphinæ acetatis	.	.	.	.	.	gr. iv.
Hazelin.	.	.	.	.	.	℥lxxx.
Extracti belladonnæ	.	.	.	.	.	gr. vj.
Cocainæ	.	.	.	.	.	gr. iv.

Misce. Fiant suppositoria xij.

Cocoa-butter was intended as the basis. The way to compound is : Melt on the water-bath 100 grains of cocoa-butter and 5 grains of white wax. Put the solid active ingredients on a slab and rub well down with hazeline, then pour some of the melted basis on it and mix, more hazeline and basis, mix, and so on until the whole is thoroughly compounded. Transfer to the dish, stir, and in about a minute the mass is ready to pour. The official powdered extract of belladonna gives the best results.

Ichthyol.—The gelatin basis is stated to be made insoluble by ichthyol, but it is largely used, and with the best therapeutic results, mostly as pessaries, *e.g.*—

Ichthyol.	.	.	.	.	.	3ss.
Mass. suppos. glycerin. B.P.	.	.	.	.	.	3iss.

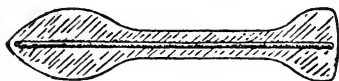
Ft. pess.

They are also made 10 per cent., 15 per cent., and so on. They should be made as required, as they become tough when kept.

Iodine.—Use the gelatin basis. With cocoa-butter there is a certain amount of absorption, and the melting-point is raised. Dissolve the iodine with potassium iodide and the minimum of water before adding to the basis (see page 204).

Iodoform.—The slightest overheating of iodoform in cocoa-butter makes it cake into intractable masses. See the example on page 195. When possible make the suppositories in the cold way, but if due care is observed in the hot method the iodoform will not cake. Observe these points : (1) Melt the basis (well shredded) on a water-bath, *not over a flame*. (2) Stir all the time, and as soon as almost all the basis is melted remove the heat from the water-pan. (3) Take half the melted basis to mix with the iodoform on the slab. Do this quickly. (4) Return the mixture to the basis-dish, stir until well mixed, heating slightly if need be, and pour into the mould.

Linted Suppositories have already been referred to. They are used in surgical operations of the rectum, and are made by taking a tuft of lint about 3 inches long, dipping the tip into melted cocoa-butter until of the right size, and then moulding by rolling on a slab with a palette-knife. A new form of suppository with a thread of soft cotton in it has been patented, the object being to keep the medicament *in situ*. This form is called 'Sempule' (registered trade-mark), and the appearance in section is shown in the figure, which is the actual size. Watson-Cheyne's bougies are made similarly. In this case



'SEMPULE' (sectional view)

soft cotton, such as is used to make spirit-lamp wick, is coated to the extent of 4 inches with the medicated cocoa-butter.

Liquids in Suppositories.—The combination of liquids with cocoa-butter is easily effected by the use of sodium stearate. The following tabulated formulæ by Mr. S. Taylor have been found to work satisfactorily, and give some idea of the utility of sodium stearate as an emulsifying agent:—

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Cocoa-butter . . .	66	64	66	69	48	68	60	72
Sodium stearate . . .	4	4	2	1	2	2	2	2
Anhydrous wool-fat . . .	--	2	2	—	—	—	—	—
Spirit of witch-hazel . . .	30	30	30	30	30	—	30	—
Oxide of zinc . . .	—	—	—	—	12	—	—	—
Hamamelin . . .	—	—	—	—	8	—	8	6
Liquid extract of hamamelis . . .	—	—	—	—	—	30	—	—
Solution of adrenalin . . .	—	—	—	—	—	—	—	20

The addition of sodium stearate does not appreciably alter the melting-point of the mass. The methods of manipulation vary. In the case of a liquid which may be boiled without injury, the liquid and the sodium stearate may be boiled together first and allowed to cool. The oil of theobroma is then added, and the whole stirred until emulsification takes place. In the case of liquids injured by strong heat the sodium stearate and oil of

theobroma may be heated together until completely mixed, and as the mass cools down the liquid may be stirred and emulsified.

Nutritive Suppositories.—These are 60-grain suppositories made with cocoa-butter or gelatin basis and dry or paste peptone. Six drachms of Mosquera beef meal and 1 ounce of cocoa-butter make a good mass either by the cold or by the hot method.

Oils (Essential).—Mixtures of cocoa-butter and essential oils are lower in melting-point than the cocoa-butter itself, hence it is necessary, in many cases, to use as much white wax as the essential oil prescribed. This, however, is not always admissible, as the following examples show :—

I.				II.			
Pulv. iodoli	.	.	gr. j.	Plumbi iodidi	.	.	gr. ij.
Ol. eucalypti	.	.	mij.	Tannin.	.	.	gr. ij.
Ol. theobromatis	.	.	q.s.	Iodoformi	.	.	gr. j.
				Ol. eucalypti	.	.	mv.
				Ol. theobrom.	.	.	q.s.
Fiat cereolus.	Mitte	vj.		Fiat suppositorium.	Mitte	xij.	

In the first case 2 grains of white wax is added to each bougie. In the second, although more essential oil is present, the tannin and other dry ingredients elevate the melting-point (compare page 191), and a satisfactory mass is obtained by using 13 grains of cocoa-butter alone for each suppository. Reduce the bulk of the tannin by trituration in a mortar, transfer to the slab, and mix with the other powders and the eucalyptus oil, using a bone spatula ; then add some of the melted cocoa-butter, transfer to the basin, mix well, and pour into the mould.

Salts in Suppositories.—The settling of the active ingredient of some suppositories at the apex has already been referred to. We have seen bromide-of-potassium suppositories sent out with all the bromide at the point, forming a hard and gritty mass, which must have been disagreeable to the patient. This is inexcusable, and need never occur if care be taken to have the substance first thoroughly impalpable, and then incorporated with a part of the cocoa-butter previous to adding

to the melted portion at a temperature a little over the melting-point. There is, moreover, another evil attending the overheating of the mixture, where powders of a ponderous nature, such as bromide and iodide of potassium, or acetate and iodide of lead, are ordered—namely, the impossibility of an equal division of the substance. The powder falls to the bottom of the dish, owing to the fluidity of the cocoa-butter, and no amount of stirring or dexterity of manipulation will ensure its equal distribution. The cold method is especially suitable in such cases. It is in this class of suppositories that the gelatin basis has the advantage—for instance, in the case of iodine.

Tannin.—Note the paragraphs on Galls and Iodoform.

Tincture of Benzoin (Compound).—A pessary containing 10 minims of this and 50 grains of cocoa-butter is easily made by the cold process.

STRENGTHS OF BOUGIES.

The following are the average adult doses of medicines given in this form:—

NASAL.

*Acid. carbolic.	.	.	gr. ss.
*Bismuth. subnitrat.	.	.	gr. v.
Cocainæ hydrochlor.	.	.	gr. $\frac{1}{8}$
*Cupri sulphat.	.	.	gr. $\frac{1}{16}$
*Iodoformi	.	.	gr. ss.
*Morphinæ acet.	.	.	gr. $\frac{1}{10}$
*Ol. pini sylvest.	.	.	℥ss.
*Plumbi acet.	.	.	gr. ss.
*Thymol.	.	.	gr. $\frac{1}{10}$
*Zinci sulphat.	.	.	gr. $\frac{1}{10}$

* These were formerly Throat Hospital preparations, and are to be made with 40 grains of gelatin basis.

URETHRAL.

Acid. gallic.	.	gr. j.
Acid. tannic.	.	gr. j.
Argenti nitrat.	.	gr. $\frac{1}{4}$ to gr. j.
Bismuthi oxidi	.	gr. v. to gr. x.
Bism. oxychlor.	.	gr. v. to gr. x.
Bism. subnit.	.	gr. v. to gr. x.
Cocainæ (& salts)	.	gr. ss.
Cupri sulphat.	.	gr. j.
Ext. bellad. alc.	.	gr. $\frac{1}{4}$ to gr. j.
Ext. opii	.	gr. ij.
Ferri perchloridi.	.	gr. ss. to gr. j.
Iodoform.	.	gr. v.
„, c̄ ol. eucalypt.	.	℥v. to ℥x.
Morph. hydroch.	.	gr. j.
Ol. eucalypti	.	℥v. to ℥x.
Plumbi acet.	.	gr. ss. to gr. j.
Salol.	.	gr. x.
Thallin. sulph.	.	gr. iij. to gr. v.
Zinci chlorid.	.	gr. $\frac{1}{4}$ to gr. $\frac{1}{2}$
Zinci sulph. exsic.	.	gr. ss. to gr. j.

STRENGTHS OF PESSARIES.

The following are the average adult doses of medicines given in this form. Those marked * must be made with oil of theobroma :—

Acid. boric.	gr. x.	Ferri sulphat. exsic.	gr. x.
Acid. carbolic.	gr. ij.	Hydrarg. oxid. rub.	gr. ij.
*Acid. gallic.	gr. x.	*Ichthyol	gr. x.
*Acid. tannic.	gr. x.	Iodoform.	gr. v.
Aconitin.	gr. $\frac{1}{36}$	Maticæ	gr. x.
Alum.	gr. x.	Morphinæ hydrochlor.	gr. ss.
Alum and catechu of each.	gr. x.	Ol. eucalypti	3ss.
Argenti nitrat.	gr. j.	Opil pulv.	gr. ij.
Atropinæ	gr. $\frac{1}{20}$	Plumbi acetat.	gr. viiss.
Atropinæ sulphat.	gr. $\frac{1}{40}$	Plumbi acet. c̄ opio	gr. ij.
Morphin. acet.	gr. ss. }	Plumbi iodid.	gr. v.
Bismuthi oxidi	gr. x.	Plumbi iod. c̄ atrop.	
Bismuthi subnit.	gr. xv.	sulph.	gr. $\frac{1}{20}$
Boracis	gr. xv.	Potassii bromid.	gr. x.
Chloral hydrat.	gr. x.	Potassii iodid.	gr. x.
Cocainæ	gr. ss.	Quininæ hydrochlor.	gr. v.
Coninæ	ṡss.	Sodii carbonat.	gr. xv.
Ext. belladon. virid.	gr. iij.	Ung. hydrarg.	gr. x.—gr. xxx.
Ext. belladon. alc. gr. ss.—gr. j.		Zinci oxidi	gr. x.—gr. xv.
Ext. conii	gr. v.	Zinci sulphat.	gr. x.
*Ferri perchlorid.	gr. v.	Zinci sulphocarb.	gr. x.

STRENGTHS OF SUPPOSITORIES.

The following are the average adult doses of medicines given in this form :—

Acid. boric.	gr. iij.	Cambogiæ	gr. iij.
*Acid. carbolic.	gr. j.	Chloral hydrat.	gr. v.
Acid. gallic.	gr. iij.	Cocainæ	gr. ss
*Acid. tannic.	gr. iij.	Cocainæ hydrochlor. gr. $\frac{1}{4}$ —gr. j.	
Aloin.	gr. j.	Coninæ hydrobromid. gr. $\frac{1}{4}$ —gr. ss.	
Argenti nitrat.	gr. j.	Cupri acetat.	gr. ij.
Atropinæ	gr. $\frac{1}{20}$	Cupri sulphat.	gr. ij.
Bismuthi oxidi	gr. x.	Elaterii	gr. ss.
Bismuthi oxychloridi	gr. x.	*Ext. belladonn. alc.	gr. iss.
Bismuthi subnit.	gr. v.—gr. x.	Ext. belladonn. vir. gr. ss.—gr. ij.	
Boracis	gr. v.	Ext. hamamelid.	gr. ss.—gr. j.

Ext. krameria gr. viij. ̄	Iodoform. gr. iij. ̄ ol.
morph. hydrochlor. . gr. $\frac{1}{10}$	eucalypti . . . m̄v.
Ferri perchlorid. . . gr. ij.	*Morphinæ hydrochlor. gr. $\frac{1}{4}$ -gr. ss.
Gallæ pulv. gr. v. ̄ opii	Opil pulv. . . . gr. j.
pulv. . . . gr. j.	*Plumbi acet. gr. iij. ̄ opio gr. j.
Gummi rubri . . . gr. v.	Plumbi iodid. . . . gr. ij.
Gum. rub. ̄ ext. nuc. vom. gr. j.	Podophylli res. . . . gr. j.
Hamamelin. . . gr. j.-gr. ij.	Santonin. . . gr. iij.-gr. vj.
Hamamelin. ̄ opio . gr. $\frac{1}{4}$	Zinci oleat. . . . gr. v.
Ichthyol. . . . gr. ij.	Zinci oxid. . . . gr. v.
*Iodoform. . . . gr. iij.	Zinci sulphat. . . . gr. ij.

Those marked with an asterisk are the British Pharmacopœia strengths.

In Dispensing Bougies a layer of cotton-wool should be placed at the bottom of the box and a piece of waxed paper over it, then the bougies should be put in flat, and if there is more than sufficient for one layer the first should be covered with waxed paper, a piece of cotton-wool, and waxed paper again. Pessaries and suppositories may be dispensed similarly, but partitioned boxes are more suitable for these. It is sometimes advisable to wrap each bougie, pessary, or suppository in tinfoil or waxed paper, especially if the compound is hygroscopic (*e.g.*, glycerin) or volatile (*e.g.*, eucalyptus oil). Glycerin suppositories, B. P., are not hygroscopic unless in a *very* damp atmosphere. The stearate sort are very hygroscopic.

OINTMENTS.

OINTMENTS are fatty compounds, of the consistence of butter, for external application. It is supposed that they should soften or liquefy when applied to the skin, so as to permit the medicament contained in them to exert its influence upon the cuticle or even to be absorbed, but a class of ointments, known as cerates, maintain their firm consistence when so applied, these being intended more as protectives than as medicinal agents. An ointment of the former class, such as zinc ointment, when applied to the skin upon lint, melts completely and soaks into the lint ; while one of the second class, such as boric ointment, remains soft and like a plaster even when removed after a day. These considerations scarcely come within the compounder's province, except in so far as he should see that all ointments which he dispenses are capable of being spread easily upon lint. This is partly a matter of melting-point, but not entirely so, seeing that cocoa-butter, a substance as hard as wax, has a lower melting-point than lard ; but it is generally recognised that ointments should melt at about 100° F., and cerates at about 120° F.

The most commonly employed bases or vehicles for ointments are (1) lard, (2) mixtures of oil and wax, (3) soft paraffin or vaseline, and (4) wool-fat or lanoline. Of these the least changeable through atmospheric influence or the action of chemicals is soft paraffin, next to it comes wool-fat, then lard and oil-and-wax mixtures, which are extremely liable to become rancid. Bases also differ in properties ; thus, in respect to absorptive power they are notably distinct. Physiological experiments by several observers place the bases in the following order, as regards rapidity of absorption of

chemicals from them : *first*, wool-fat ; *second*, lard and combinations like simple ointment ; and a bad *third*, vaseline. It has been found that chemicals compounded with lanoline applied to the skin show themselves in the urine before corresponding compounds with other bases. Again, a strychnine ointment made with lard (1 in 4) applied to the shaved scalp of a 12-lb. dog killed it in twenty minutes, but a similar ointment made with vaseline produced no effect. On the other hand, Dr. A. P. Luff experimented with ointments of potassium iodide, by an exosmosis process—the ointment was put in a bladder, the bladder in water, and the test-reagent added to the water. It was found that the vaseline ointment gave the iodide reaction in one hour, the lard one in nine hours, and the lanoline none at all at the end of twenty-four hours. The experience of others is entirely opposed to Dr. Luff's conclusion that paraffin ointments are most absorptive.

Another characteristic which distinguishes the ointment-bases is their relative miscibility with water. A good deal of work has been done on this subject, but the following results by Scoville and Loftus are conclusive. They represent parts by weight of the respective fluids absorbed by 100 parts of the bases after diligent mixing :—

Basis Used.	Water.	Sat. Sol. Zn Sulph.	Liq. Plumbi Subacet.	Pot. Iod. Sol. 1-2.	Sat. Sol. Sod. Chlor.
Lard	12-16				
Lard and 5 p.c. wax .	20	34	90	30	20
Simple ointment .	20	37	75	40	30
Petrolatum (vaseline) .	12-23	28	22	25	27
White petrolatum .	7½-11	23	15	22½	23
Wool-fat	216	140	212½	185	120

In comparing these figures the fact should not be overlooked that the volumes do not differ so greatly, owing to the greater densities of the salt solutions compared with water.

GENERAL INSTRUCTIONS.

For compounding ointments a slab of marble or porcelain and a steel or horn spatula are generally employed, but if the

ointment contains an insoluble powder the mortar and pestle must be used. The slab is all right for experienced operators, but even they cannot be sure that they get the powder equally uniform by this means. The better plan is to put the powder in a mortar, which in cold weather should be warmed with boiling water ; if the basis be not too hard or too bulky, the heat of the mortar suffices to liquefy it sufficiently for thorough mixture. The powder is rubbed with a little more than its own weight of the basis until a perfectly smooth mixture is obtained, no appearance of grit being evident to the eye, or to the finger and thumb when a little is rubbed between them. The rest of the basis is then added in portions until the whole is thoroughly incorporated.

Extracts, balsams, or any fluid or semi-fluid should be added in such a state as is best fitted to produce a perfectly homogeneous mixture. In regard to powders a small proportion of the basis is, in the majority of cases, sufficient to reduce them to a fine enough state of division ; but in some cases, and often with extracts, a preliminary treatment with some medium, such as oil, water, or spirit, is necessary. Whatever medium is chosen, it should not in any way interfere with or affect the medicinal properties of the ointment. Watery extracts should be rubbed down smooth with a little water before being combined with the fatty basis, and spirituous extracts with a little diluted spirit. Soluble salts, such as perchloride of mercury, sulphate of zinc, and nitrate of silver, which are likely to crystallise, are best rubbed smooth with a little oil or dissolved. Very soluble or deliquescent salts, such as carbonate or iodide of potassium and chloride of zinc, are best rubbed down with a little water, if this will not favour interaction with other ingredients. Tartarated antimony should be mixed dry with the ointment-basis.

Ointments are prescribed occasionally whose ingredients must be melted. In such cases the hardest ingredient—*e.g.*, wax or hard paraffin—should first be melted by the heat of a water-bath or well-regulated gas-flame, the other fats or oils next added, the mixture stirred until clear, and then strained

through cheese-cloth or fine muslin into the pot. If the mixture has not been overheated, the contents of the pot may be allowed to cool without stirring, as it has been shown that ointments so prepared solidify uniformly and without becoming lumpy ; but if the ointment contains any ingredient which may separate on cooling, it is advisable to pour the strained mixture into a warm mortar and triturate constantly until the mass becomes pasty. Liquids are frequently added to ointments in order to impart a cooling property to them, as in the case of cold-cream. In the preparation of these ointments a *quasi*-emulsion has to be made, and circular stirring towards the dispenser is important. The action must always be slow, and larger quantities of a liquid can be incorporated thus than the inexperienced would deem possible. A striking instance is shown in incorporating liquor plumbi subacetatis with lard. Not less remarkable is the effect on colour : otherwise dark ointments can be rendered nearly white, and with very faint indication of the original colouring ingredient. This is the case with various shades of brown, yellow, or greenish vegetable colours, the exception being with regard to the partial decoloration of certain chemical salts, such as red oxide of mercury.

Order of Mixing is sometimes as important in the case of ointments as in mixtures, *e.g.* :—

Liq. antim. terchlor.	.	.	.	.	.	℥ v.
Hydrarg. ammon. chlor.	.	.	.	.	.	gr. xx.
Hydrarg. nit. ox.	.	.	.	.	.	gr. xv.
Potassii subcarb.	.	.	.	.	.	ʒj.
Adipis	.	.	.	.	.	ʒj.

This ointment retains its pink colour if the subcarbonate is rubbed down with a little lard, but if dissolved in a few drops of water, the final addition of the liq. antim. terchlor. produces a brown colour, due to the formation of ferric hydrate, iron always occurring in commercial samples of 'butter of antimony.' In a fatty medium the incompatibles are slow to react. This is further instanced by the fact that tannin

ointments may with impunity be made with a steel spatula, as no blackening occurs unless an aqueous ingredient is present.

SPECIAL MEMORANDA.

Acidum Carbolicum.—Although the solubility of phenol in fats and oils is greater than 1 in 10, not more than 1 part dissolves in 25 parts of soft paraffin, so that paraffin ointments containing more than that proportion show separate crystals of the acid on cooling. This peculiarity indicates that the hot mixture is not a true solution, or that the force of crystallisation is stronger than that of solution. It is advisable to prepare such ointments in the cold, by mixing the liquefied acid with the basis, or dissolving the crystallised phenol in glycerin before mixing with soft paraffin.

Acidum Hydrocyanicum Dilutum.—This should be mixed on the slab with the cold basis, using a horn or bone spatula, and mixing as quickly as possible, thus :—

Extracti belladonnæ virid.	.	.	.	.	℥iss.
Acidi hydrocyanici, Sch.	.	.	.	.	℥ss.
Adipis	.	.	.	.	℥j.

M. Fiat ung.

A thoughtless dispenser might thin the extract with the acid ; this should be done with a little water, the lard then mixed with it, and the acid added in drops, mixing expertly on a slab.

Acidum Salicylicum.—Always use horn or bone spatulas for this acid, which sometimes gives rise to unexpected results. For example, the following became quite lumpy on keeping :—

Zinci oxidi	.	.	.	.	.	℥ss.
Amyli pulv.	.	.	.	.	.	℥ss.
Acidi salicylici	.	.	.	.	.	gr. x.
Adipis lanæ hydros.	.	.	.	.	.	℥ss.
Paraffini mollis	.	.	.	.	.	℥ss.
Olei lavandulæ	.	.	.	.	.	℥vi.

Fiat unguentum.

The lumpiness was due to formation of zinc salicylate, the water of the lanoline sufficing to bring the acid and zinc oxide together. As the lumpiness arose on keeping, it was avoided by completing the reaction before dispensing the ointment. One drachm of zinc oxide and 10 grains of the acid were triturated in a mortar with 80 minims of water. Separately the rest of the ingredients (170 grains of anhydrous wool-fat) were made into an ointment and added to the mortar-contents and well mixed. It is generally advisable, when a chemical change takes place in an ointment slowly, to bring it about quickly before compounding with the fatty basis.

Acidum Tannicum.—This acid should be compounded with fats in the cold, if possible. First triturate the acid lightly in a mortar, then add its own weight of the basis, and continue trituration for three minutes before adding the rest. This is the plan to adopt with most crystalline substances.

Alkaloids.—It is commonly said that alkaloids ordered in ointments should be combined as oleates, so that they may be certain of absorption. The remarks made on this subject in dealing with suppositories apply equally to ointments. It is not advisable to add oleic acid unless the ointment is to be used by friction. Castor oil has been recommended for dissolving pure alkaloids either for use in such solution or previous to admixture with another base. In this connection it is well to bear in mind that castor oil and liquid paraffin are not soluble in each other: they appear to be at first sight, but ultimately separate into two layers. Alkaloidal salts, which are readily soluble in water, may be dissolved in the smallest possible quantity of that solvent before being added to the basis, provided the weight of the ointment is not materially increased by the addition.

I.
 Atropinæ . . . gr. j.
 Vaselin. flav. . . ʒij.
 M. Fiat unguent. pro oculis.

II.
 Atropinæ . . . gr. j.
 Cocainæ . . . gr. j.
 Vaselini albi . . . ʒij.
 Dissolve with gentle heat, and
 when cold add—
 Acidi boricæ . . . gr. viiss.

No. I. is the prescription of the late Mr. Marcus Gunn. It is peculiar in prescribing yellow vaseline, because Mr. Gunn found from experience that white vaseline irritates the eye, which is against the rule 'white vaseline for colourless ointments, yellow for any other.' The ointment was made by triturating the alkaloid with a few grains of the basis and adding the rest. It acted promptly and perfectly. From the ointment No. II. atropine crystallised out on cooling. This alkaloid was therefore mixed with the boric acid, the cocaine dissolved in the vaseline, and the two then incorporated.

Balsam. Tolutan.—An ointment containing 1 ounce of this balsam and 1 ounce of lanoline was compounded by Mr. Forster (Northampton) by dissolving the balsam in 6 drachms of chloroform (by careful heating), squeezing through muslin, and mixing with the lanoline.

Camphor.—Rarely prescribed *per se* along with fats, but when that happens the only course is to dissolve the camphor in the melted basis, as in the case of the following prescription:—

Camphoræ	3j.
Zinci oxidi	3ij.
Vaselini	3iss.

Here put a drachm of flowers of camphor in the vaseline melted in a 1-ounce quinine-bottle placed in a pan of hot water; shake until dissolved (which takes only a few seconds). Put the zinc oxide in a mortar and triturate with a few drachms of the camphorated vaseline until smooth, then add the rest.

Chloral Hydras.—To look at, the following prescription would seem to provide a very hard ointment:—

Chloral	1 part
Menthol	1 part
Cocoa-butter	4 parts
Spermaceti	2 parts

Melt the cocoa-butter and spermaceti, and when getting creamy add the chloral and menthol, previously powdered, and stir until cold. The chloral prevents the basis from becoming quite solid. Compare remarks on page 196.

Chrysarobin ('Chrysophanic acid').—This should be dissolved, if possible, in the fatty basis of the ointment, but if there is not sufficient fat to form a perfect solution, it is preferable to rub the chrysarobin to fine powder, and gradually incorporate the solid basis with it. Chrysarobin is more soluble in castor oil than in lard.

Cocaine.—This alkaloid is frequently prescribed to be dissolved in melted vaseline or lard. Ointments containing 1 of cocaine in 20, when prepared in this way, exhibit microscopic crystals on cooling. Wyatt finds that the alkaloid is soluble only to the extent of 1 in 150 of soft paraffin, and, taking advantage of its greater solubility in olive oil (1 in 20), suggests that each grain of cocaine should be rubbed with 20 minims of the oil before adding to the paraffin basis. The British Pharmacopœia plan is to dissolve the alkaloid in four times its weight of oleic acid. When the ointment is for the eyes simply triturate the alkaloid with the cold basis. The salts should be dissolved in water before mixing with the fat prescribed.

Extracts should always be thinned and the fatty matter added in portions, as in the case of

Unguentum Hyoscyami (Middlesex Hospital).

Ext. hyoscyami. 3ss.

Adipis 3ss.

Glycerini 3j.

Mix the extract with the glycerin, then add the lard.

Liquid extracts are most easily incorporated with fatty bases by using a warm mortar; *e.g.*, hamamelis ointment, B.P., cannot be satisfactorily and quickly made on a slab, but in a warm mortar it presents no difficulty.

Glycerin is most easily incorporated with fats by using a mortar which has been first thoroughly warmed with hot water.

Hydrargyri Oxidum Flavum.—The original Pagenstecher's ointment is made with oxide freshly precipitated from dilute solutions of mercuric chloride and caustic soda, the washed precipitate being dehydrated by washing with alcohol and ether in succession. This is all done in a dark room, even

the mixing with the basis—said to be spermaceti ointment, but the acidity of that basis destroys the colour of the oxide (see page 216). Dr. W. H. Martindale (*C.&D.* 1906, II. 719) mixes the moist precipitate (without alcohol-ether washing) with soft paraffin in the proportion of 10 of paraffin to 1 of yellow oxide (in the precipitate), diluting as required. Mercuric chloride $1\frac{1}{4}$ yields 1 of yellow oxide. Another good basis for the moist precipitate is wool-fat 1 and soft paraffin 8.

Hydrargyri Perchloridum.—Small particles of mercuric chloride irritate the skin intensely, so that in compounding into ointment it is advisable to triturate with glycerin (2 minims to each grain) before adding the basis. When prescribed along with potassium iodide in ointment, rub together in a mortar until perfectly smooth, then mix with the basis. In this case it is apparently the intention to have mercuric iodide formed before the basis is added, and in this connection it should be noted that if the ointment does not contain free alkali (potassium carbonate) it liberates iodine on the cotton dressing or on the abraded skin of the patient, causing intense annoyance. The decomposition has even been observed with ung. potassii iodidi containing 1 of mercuric iodide in 3,000 of the ointment.

Ichthyol.—The ammonium ichthyol is generally used, and if prescribed with water and fat dissolve the ichthyol in the water, adding to the fat gradually.

Iodine is first rubbed down by itself, then with about its own weight of the fatty excipient. At this point a few drops of rectified spirit should be added, and the rest of the basis then worked in. If any haloid salt, such as iodide of potassium, is to be combined in the ointment, triturate the iodine with the salt and sufficient water to dissolve, then work in the basis.

Iodoform in ointments should be reduced to fine powder and mixed with the cold basis. Heat should not be used. See remarks under Suppositories.

Mercurial Ointments.—A series of experiments published in *The Chemist and Druggist*, 1884, page 18, proved

that mercurial ointments may be made with steel knives with out harm, unless an acid or aqueous ingredient be present.

The following prescriptions serve as good examples of chemical changes leading to difference in physical appearance on keeping :—

I.	II.
Ung. zinci ʒj.	Hydrarg. oxidi flav. . . gr. viij.
Ung. plumbi subacet. . . . ʒj.	Ol. olivæ ℥xij.
Ung. hydrarg. nit. . . . ʒj.	Ung. cetacei ad ʒj.
Fiat unguentum.	Fiat unguentum.

No. I. became dark green in colour, a change which suggests formation of black mercurous oxide and yellow mercuric oxide. In No. II. white streaks formed on keeping, probably owing to fatty acids combining with the yellow oxide ; spermaceti ointment is in any case a bad basis for eye-ointments, as it irritates on account of the benzoin which it contains. It is customary to prepare it without benzoin for ophthalmic use.

Oleates.—For the preparation of oleates see ‘Pharmaceutical Formulas,’ page 562, and *C. & D.*, March 30, 1901, page 524. It is important for dispensers to remember that oleates should not be melted in metallic dishes, but in porcelain basins, glass rods or bone spatulas being used to stir or mix them. If the oleates are prescribed for their local effects, and are to be diluted, vaseline is the best diluent ; on the other hand, if absorption is not to be retarded, oleic acid should by preference be used, or lard, lanoline, or fixed oil. The oleates of the alkaloids are generally employed without dilution. Most of the metallic oleates are obtainable in the powder form for use as dusting-powder or for making ointments. The following are the accepted strengths of the more common oleates or oleate-ointments :—

Aconitine, 1 grain ; oleic acid, 49 grains.

Aluminium.—Oleate, 1 or 2 drachms, to 1 ounce lard.

Arsenic.—Oleate, 20 grains ; lard, 1 ounce.

Atropine, 1 grain ; oleic acid, 49 grains.

Bismuth Oleate is made into ointments of strengths varying from 5 to 20 per cent. with yellow vaseline as the diluent.

Cocaine, 6 grains ; oleic acid, 94 grains. [The B.P. ointment contains cocaine 4, oleic acid 16, lard 80.]

Copper.—Ten and 20 per cent. ointments are generally used, the diluent being soft paraffin with a fifth of its weight of hard paraffin added to it. Lard is preferred by some physicians. Melt the oleate with the basis and stir until cold.

Iron.—Oleate and lard, equal parts.

Lead.—Hebra's ointment is a favourite remedy in skin-diseases. It is generally made by melting lead plaster in its own weight of olive oil, but equal parts of the plaster and vaseline make a much better preparation. Melt the plaster first, then add the vaseline or oil, and perfume with oil of lavender.

Mercury.—Precipitated mercuric oleate is now in the British Pharmacopœia, its ointment consisting of 1 part and 3 parts of benzoated lard. Oleates of mercury and morphine contain 1 grain of the alkaloid in each drachm, irrespective of the mercurial strength.

Nickel.—Oleate, 1 part ; lard, 7 parts.

Quinine.—One part of the alkaloid dissolved in 3 parts of oleic acid.

Silver.—One part of the oleate to 9 parts of lard.

Strychnine.—One grain in 49 grains of oleic acid.

Tin.—Oleate, 1 part ; lard or vaseline, 7 parts.

Veratrine.—One grain dissolved in 49 grains of oleic acid.

Zinc.—The British Pharmacopœia ointment is made with precipitated oleate, which in the dry state is largely used as a dusting-powder, generally diluted with boric acid, starch, or talc, or a mixture of these.

Oleates in combination are liable to curious changes in colour—for example, mercuric oleate with ung. potassii iodidi is blue on mixing, but becomes brown quickly, and in a few days it is yellowish white, owing to a series of chemical changes

which finally fix the oleic acid as potassium oleate (soft soap). The following are also interesting :—

I.	II.
Quininæ sulphat. . . . ʒss.	Cupri oleatis ʒj.
Ung. bismuthi oleat. . . . ʒss.	Lanolini c̄ oleo ʒj.
Ung. hydrarg. oleat. . . . ʒss.	Fiat unguentum.
Fiat unguentum.	

No. I. when dispensed with white soft paraffin (bleached with acid, probably) as the basis for the oleate ointments became green in colour, but did not change with the unbleached paraffin. Copper oleate is easily reduced on heating with certain substances. This was found to be the case with No. II. when the oleate was warmed with 2 drachms of lanoline, but not so when it was melted with olive oil on a water-bath, and the lanoline added when nearly cold.

Percentage questions in respect to the oleates sometimes give rise to divergence of opinion. Thus in a prescription (1897) 'oleat. zinci (5 per cent.) ʒss.' occurred, and the dispensers in the pharmacy suggested that (1) 12 grains of zinci oleat. pulv. should be used or (2) 2 drachms of zinci oleat. B.P., 1885, and the same of oleic acid. At that time the oleate of the British Pharmacopœia contained 10 per cent. of zinc oxide, and there should have been little hesitation in concluding that the prescriber meant a similar preparation containing 5 per cent. of oxide. This oxide basis of calculation no longer obtains since the pharmacopœial preparations are made by interaction of hard soap and soluble metallic salts. Normal oleate of mercury (to which the B.P. oleated mercury approximates) contains the equivalent of 28·4 per cent. of mercuric oxide, and normal zinc oleate the equivalent of 12·9 per cent. of zinc oxide.

Paraffin Ointments.—Ointments made with hard and soft paraffins are apt to be granular unless they are very carefully made. Melt the paraffins, pour into a mortar previously well warmed with boiling water, and stir *constantly* until cold or *not at all*. The difficulty of producing a smooth paraffin ointment has led to an extension of the manufacture of milled ointments. An ointment-mill is beyond an ordinary pharmacy,

but a uniform and plastic ointment is obtained by forcing the cold ointment through a perforated plate or wire gauze equal to a No. 40 sieve. Constituents of an ointment soluble in each other do not separate when allowed to cool without stirring (see page 210). If the ointment contain any powder, rub this up with a little of the soft paraffin before adding the melted mixture. Resin (colophony) is insoluble in soft paraffin, and mixtures containing it must be stirred constantly until they set. Although it lays down no specific rule for the guidance of dispensers, the British Pharmacopœia in its formulæ directs white soft paraffin to be used for colourless ointments, and yellow for others. Sulphuric acid is employed in bleaching some makes of white soft paraffin, and appears to leave something irritating behind.

Resorcin.—Few articles give dispensers so many surprises as resorcin, the dihydric phenol ($C_6H_4.2OH$) which is so largely used in producing artificial dyes. It is a powerful reducing body, and greedily absorbs oxygen from its environment, becoming changed from its colourless state to rose or dark brown; the following illustrate what may happen in ointments :—

I.

Resorcin.	.	.	.	3ss.
Hydrarg. ammon.	.	.	.	gr. xxv.
Vaselin. alb.	.	.	.	3ij.

Fiat unguent.

The resorcin was dissolved in spirit and added to the other ingredients previously mixed; the product became blue owing to reduction of ammoniated mercury. The resorcin should not be dissolved in spirit. Rub it to powder and mix with half the vaseline, do the same with the ammoniated mercury, and mix the two.

II.

Resorcin.	.	.	.	.	℥j.
Sulphur. præcip.	.	.	.	.	℥j.
Pulv. amyli	.	.	.	.	3ij.
Boracis	.	.	.	.	3ss.
Vaselinum	.	.	.	.	ad 3j.

Fiat unguentum.

The powders were triturated together and mixed with vaseline. The ointment was of a pea-green colour in ten days. It does not become so if the resorcin is triturated with a drachm of vaseline before adding to the rest.

Sometimes the No. I. combination has liq. carbonis deterg. along with it, in which case a blue colour is inevitable.

Sapo Durus.—A prescription which turns up periodically, and which hails from Buxton, is—

Potassii iodidi	ʒiij.
Saponis	ʒij.

This is really a cipher prescription: what the prescriber wishes the patient to get is lin. potass. iodidi c̄ sapone.

Thymol should only be combined in a state of solution. A good way of compounding is to add about its own weight of camphor and rub them together. These form an uncrystallisable fluid. Crystals of thymol are exceedingly irritating.

Cupri oleatis	ʒj.
Thymolis	gr. x.
Acidi salicylici	gr. x.
Lanolini	ʒiij.
Adipis benzoat.	ʒv.

In this case dissolve the thymol in the lard by the aid of a gentle heat, and mix with the lanoline and other ingredients, previously incorporated.

Tinctures and other spirituous substances are not easily combined with fat. Ordinary soft lard will take up one-fifth, hard lard will take up one-sixth, of its weight of tincture. To mix them, the lard or other fatty substance should be spread evenly on the bottom and sides of the mortar, and the tincture added gradually. A little soap-powder, if permissible, greatly facilitates the combination.

Lin. camphoræ co.	ʒij.
Ung. potass. iod.	ʒij.

To compound this without alteration of the formula, place the ointment in a mortar, add the liniment drop by drop, and stir constantly. The ammonia in the liniment combines with the fat of the ointment to form a soap, thus greatly assisting the compounding. This method requires considerable care.

Unguentum Domesticum is the name given by Unna to a mixture of yolk of egg, 2 parts, and almond oil, 3 parts, 1 per cent. of Peruvian balsam being added as a preservative.

This is particularly adapted for balsam, tar, and ichthyol preparations, with or without additional fatty matter, especially when watery ingredients have to be added. The vehicle has great water-absorptive power.

Vasogen.—The commercial product is an ointment-basis. See *C. & D.*, 1906, 1.514, and 'Pharmaceutical Formulas,' p. 819.

Sending out Ointments.—If the patient can afford it, always send out ointments in covered pots. If not, use chip boxes, preferably flat shape, previously dipped in melted hard paraffin. Tins are now largely used for ointments; those with rounded bottoms are best. The dispenser must use his discretion as to what he puts into them. They are not suited, for example, for ointments containing active chemical substances or much water. It is customary to cover with 'waxed paper.' Preference should be given to paraffined paper: wax or stearin paper is often rancid, and affects the ointment. When ointments are of a semi-fluid character, or if very volatile ingredients are present, a wide-mouth stoppered bottle should be used. Very poisonous ointments should be labelled 'Poison' on the pot as well as on the lid.

SALVE-MULLS.

This is the common name for steatins, or spread cerates, preparations intermediate between ointments and plasters, which are spread upon muslin in the proportion of 100 grammes (3xxv.) to 1 metre by 20 cm. (39 inches by 8 inches). The following are typical formulæ:—

STEATINUM ACIDI BORICI.

Powdered boric acid . . .	3j.
Benzoated lard . . .	3ij.
Mutton-suet (rendered) . .	3vij.

Melt the fats, triturate the acid in a warm mortar with some of the melted fats, transfer to the rest, and stir occasionally until cold.

Resorcin and zinc-oxide steatins are made in exactly the same proportions.

STEATIN. DIACHYLON.

Lead plaster . . .	3v.
Mutton-suet . . .	3iij.
Benzoated lard . . .	3ij.

Melt together and stir occasionally until cold.

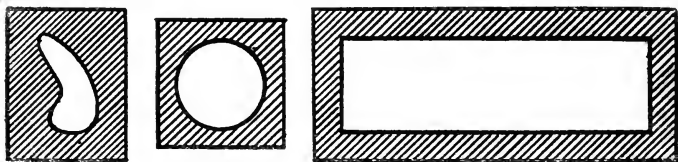
STEATIN. ICHTHYOL.

Ammonium ichthyolate . .	3j.
Benzoated lard . . .	3j.
Mutton-suet . . .	3viiij.

Prepare in the same way as steat. ac. boric.

PLASTERS.

It is seldom nowadays that the dispenser is called upon to spread other than a cantharidin plaster, and, consequently, few of the rising generation can handle the plaster-spatula with dexterity. It is customary to use paper shapes in spreading plasters, for if not used the edges are uneven. There should be no hesitation about the way to melt the plaster. Sufficient for the surface required (average 15 grains per square inch) is shaved off the roll and melted in a porcelain dish over a gentle gas-flame or water-bath. This is the surest plan. While the plaster is melting the leather may be cut and prepared ; allow an inch all round for a margin. The shape of the plaster is



PLASTER-SHAPES.

cut from white wrapping-paper, which should be wetted on the label-damper and placed on the margin. Zinc shapes are kept for stock plasters. By the time the paper shape is adjusted the plaster will have melted. The plaster must not be so hot as to frizzle the leather, and the spatula, warmed in a gas-flame, should not make the leather curl, but be just hot enough to smooth it. Place the leather on a thick pad of paper, and smooth it before putting on the shape. Having obtained the proper temperature (as low as will permit of easy spreading), the melted plaster is poured on the leather near the margin,

and the operator applies his spatula at a slight angle, the point of the blade somewhat overlapping the paper shape. The plaster is pushed with a gently firm pressure in such a manner that the iron may not be raised from the leather until it has gone all round it (the leather being turned to suit the position of the operator, but the spreading must not be stopped while this is being done). Evenness of spreading is attained by regularity of pressure; but no one can spread a plaster properly who does not do it in a few rapid strokes. The plaster-iron generally used is a thick belt of iron $3\frac{1}{2}$ inches long, by $\frac{3}{4}$ inch



PLASTER-SPATULA.

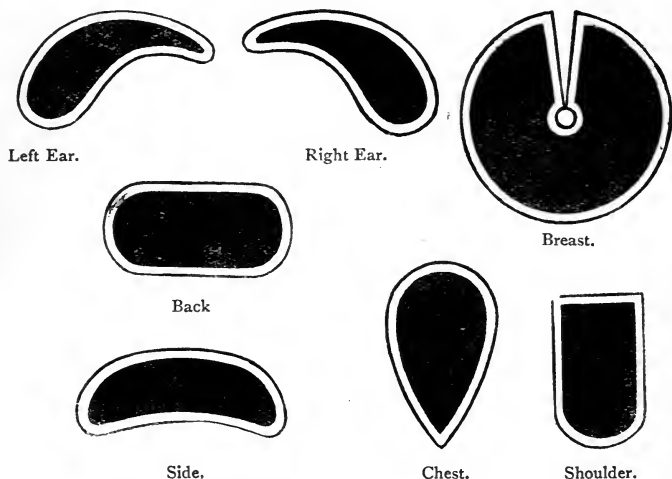
wide and thick. The form illustrated is specially adapted for spreading large plasters, as well as for compounding ointments.

When a plaster on leather with an adhesive margin is required, it is customary to leave one non-adhesive margin outside the adhesive one. The first step is to place in the centre of the leather a piece of paper the size of the plaster, and outside this a shape that will leave $\frac{1}{2}$ inch or so between the centrepiece and the non-adhesive margin. Spread with soap plaster, when cold remove the central piece of paper and put on a shape (well soaped) which will cover the adhesive part, and spread with the plaster.

Plasters for bed-sores (soap cerate usually) are spread without margin on split-skin or chamois leather.

Paper Plaster-shapes may generally be attached to leather by merely damping the paper, and pressing down with a dry cloth. If the shape is to be laid on a previously spread plaster, it should be well brushed with thin soft soap; after its removal, any soap adhering to the plaster must be taken off with a wet cloth or sponge.

Breast-plasters should be about 7 inches in diameter, exclusive of 1 inch margin, with a hole near the middle 1 inch in diameter, and with a piece cut out, beginning from



SHAPES OF PLASTERS FOR DIFFERENT PARTS OF THE BODY.

the hole and gradually widening towards the circumference to about 1 inch, so as to allow the plaster to be adapted to the curved surface of the breast.

If a plaster is wanted soon after it is spread, place it on a cold metal surface, where it quickly hardens. Waxed paper (or paper rubbed on one side with a piece of hard soap) should be used for covering it. Send out in a box if possible.

It is not permissible in the United Kingdom to dispense rubber-combination plasters of official *emplastra* unless specially prescribed, as the basis differs from those in the British Pharmacopœia. The process by which they are made is substantially as follows :—

1. Purification of indiarubber by macerating and pressing it, and removing foreign impurities by elutriating with water.

2. Forming a homogeneous mass of the dried purified rubber by working it on heated revolving rollers and incorporating sufficient quantities of orris-powder and resins.
3. Incorporating the medicinal agent—*e.g.*, belladonna extract—with the rubber mass by working it on warmed revolving rollers.
4. Spreading the prepared plaster on a suitable fabric.

An adhesive plaster similar in properties to rubber plaster can be extemporaneously prepared as follows :—

Rubber (cut in small pieces)	.	.	.	20 grammes
Soft paraffin	.	.	.	20 grammes
Lead plaster	.	.	.	960 grammes

Melt the rubber at a temperature not exceeding 150° C., add the soft paraffin, and continue the heat until the rubber is dissolved. Add the lead plaster to the hot mixture, continue the heat until it becomes liquid; then let it cool, and stir it until it stiffens. (Compare with *The Chemist and Druggist*, 1907, II. p. 178.)

Blisters (emp. cantharidis, B.P. 1898) are spread on adhesive plaster (calico). Cut a paper shape of the size desired, and place it on the plaster, leaving $\frac{1}{2}$ inch to $\frac{3}{4}$ inch margin. Now soften the cantharides plaster by working it in the hand for a minute or two, and then spread over the calico with the thumb, usually, although some prefer a slightly warmed spatula. The objections to the thumb method are that it is not elegant and the plaster is spread unevenly, as may be judged by holding it between the eyes and the light. The plaster should be of such thickness that the yellow colour of the adhesive plaster should be obliterated when it is held up to the light. When spread remove the shape, trim the edges of the calico, and cover the blister with waxed paper. These remarks also apply to the cantharidin plaster of the British Pharmacopœia, 1914, which differs essentially in appearance from the old plaster, and this may help to extinguish the bad practice of 'finishing-off' blisters by rubbing them with powdered cantharides or brushing with liquor epispasticus.

Plaster-mulls are preparations like salve-mulls, with a plaster basis, prescribed by Unna.

PASTES AND JELLIES.

MODERN dermatological methods are responsible for the introduction of various forms of applications which are neither ointments nor lotions, and which may or may not be fatty. Specialists find that a vehicle which has not itself any action upon the epidermis is hard to discover. Dr. Unna is one of the most fertile innovators in this line. It was he who introduced the now universally known jellies, composed essentially of glycerinated water solidified with gelatin and mixed with a medicament suitable for the diagnosed disorder. The best known is *zinc-jelly* or *zinkleim* (*i.e.*, zinc glue), for which the formulæ are—

	Common.	Hard.
Oxide of zinc	℥iij.	℥iij.
Gelatin	℥iij.	℥iv.
Glycerin	℥v.	℥v.
Water	℥ix.	℥ix.

All by weight. Soak the gelatin in the water overnight, and afterwards dissolve by the heat of a water-bath. Triturate the oxide of zinc with the glycerin, and mix intimately with the warm gelatin solution. Add water, if necessary, to make the weight 20 to 21 oz.

These gelatin pastes are applied while hot to the skin with a brush ; they are supposed to exert a highly cooling effect upon the skin, are as protective as fatty compounds, and do not interfere with the perspiration. While the gelatin is still warm upon the skin a muslin bandage is wound round, and the jelly penetrating into the meshes of the muslin—of which several layers are applied—gives to the disordered part quite a firm, slightly compressing case.

The following are other prescriptions of Unna's which it is useful for dispensers to know. All the ingredients are to be taken by weight :—

GELATUM ACIDI ACETICI.

Gelatin	℥j.
Distilled water . . .	℥iiss.
Glycerin	℥v.
Glacial acetic acid . .	℥ss.

M.S.A.

GELATUM ACIDI SALICYLICI.

	5 p.c.	10 p.c.	20 p.c.
Gelatin	℥j.	℥j.	℥j.
Glycerin	℥iv.	℥ivss.	℥v.
Water	℥ivss.	℥iv.	℥ij.
Salicylic acid . . .	℥ss.	℥j.	℥ij.

M.S.A.

GELATUM CHRYSAROBINI.

Gelatin	℥ss.
Water	℥v.
Glycerin	℥ix.

Proceed in the usual way, and evaporate to 9½ oz., then add—
Chrysarobin, in fine powder ℥ss.

Mix well.

GELATUM ICHTHYOL.

Gelatin	℥j.
Distilled water . . .	℥iiss.
Glycerin	℥vj.
Ichthyol	℥j.

Proceed as for gel. chrysarobin.

GELATUM IODOFORMI.

	5 p.c.	10 p.c.
Gelatin	℥ss.	℥ss.
Water	℥vij.	℥viss.
Glycerin	℥ij.	℥ij.
Iodoform	℥ss.	℥j.

Proceed as for gel. chrysarobin.

GELATUM NAPHTHOL-BETA.

As 10 per cent. gelat. iodoformi, but with beta-naphthol. ℥v.

GELATA ZINCI VARIA.

To the quantities for the hard jelly may be added 1 oz. of tar or of extract of cannabis or of resorcin; to the common, 1 oz. precipitated sulphur or ½ oz. to 1 oz. of ichthyol.

These jellies were at one time alternatively called 'pastes,' but Dr. Unna has, since their introduction about 1886, prescribed other preparations more correctly termed 'pastes.' These closely resemble glycerin of starch, the ointment-basis substitute introduced by the late Mr. G. F. Schacht and officialised by the British Pharmacopœia. Others are based upon Lister's original carbolic paste (prepared chalk made into a paste with carbolic oil). The following formulæ, which are reprinted from 'Pharmaceutical Formulas,' are the more commonly required preparations :—

PASTA ICHTHYOL.

(Unna).

Ammonium ichthyolate	℥ij. to ʒij.
Powdered dextrin . . .	ʒj.
Distilled water . . .	ʒj.
Glycerin	ʒvj.

Dissolve the ichthyol in the water and the glycerin, mix with the dextrin, and heat on a water-bath until uniform.

IHLE'S PASTE.

Starch	ʒij.
Zinc oxide	ʒij.
Lanoline	ʒj.
Vaseline	ʒiij.

Mix.

This is the basis, and it is medicated with various substances, such as resorcin (2 per cent.).

PASTA NAPHTHOL.

(Lassar).

Beta-naphthol . . .	ʒj.
Precipitated sulphur . .	ʒv.
Yellow vaseline . . .	ʒij.
Soft soap	ʒij.

Mix the powders, add the vaseline and soap, and mix thoroughly.

PASTA PLUMBI

(Unna).

Litharge	ʒvj.
Vinegar	ʒij. ʒij.

Boil together until the solution is syrupy, then add—

Starch	ʒv.
Water	ʒij.

Again boil, and add—

Glycerin	ʒij.
--------------------	------

Mix, and heat if necessary until the paste weighs 5 oz.

PASTA RESORCIN.

(Lassar).

	Fortior.	Mitior.
Resorcin	ʒij.	ʒj.
Zinc oxide	ʒij.	ʒiiss.
Starch	ʒij.	ʒiiss.
Vaseline oil	ʒiv.	ʒiv.

Rub all the powders together until they are impalpable, then make into a paste with the oil.

PASTA ZINCI.

Unna's Stiff.

Zinc oxide	ʒiiss.
Kaolin	ʒss.
Benzoated lard	ʒvij.

Mix intimately.

Unna's Soft.

Prepared chalk	ʒj.
Zinc oxide	ʒj.
Linseed oil	ʒj.
Lime-water	ʒj.

Mix.

Lassar's.

Zinc oxide	ʒiij.
Starch	ʒiij.
Salicylic acid	ʒij.
Vaseline	ʒvj.

Levigate the powders together, and make into a paste with the vaseline.

PASTA ZINCI SULPHURATA

(Unna).

Zinc oxide	ʒiss.
Precipitated sulphur . .	ʒj.
Kaolin	ʒss.
Benzoated lard	ʒvij.

Levigate the powders together, and mix with the lard.

Schleich's Skin-remedies.—The influence of German practice upon dermatological pharmacy is further illustrated by the prescriptions of Dr. C. L. Schleich, Berlin, some of which, appropriate to this chapter, are quoted from *The Chemist and Druggist*, 1900, II. 98 and 138, as being sometimes called for at the dispensing-counter :—

CERATE PASTE.

Melt 1 kilogramme of yellow wax in a large basin on a water-bath; remove, add 100 grammes of strong solution of ammonia gradually, stirring constantly; return to the water-bath, and stir until a soft, anhydrous bright-yellow mass is obtained. If acid, neutralise by adding more ammonia.

CERAL-CRÈME.

Cerate paste . . .	50 grammes
Vaseline . . .	50 grammes
Zinc oxide . . .	10 grammes
Otto of rose . . .	5 drops
Solution of eosin . .	2 drops

Mix and make an ointment.

CERAL VASELINE.

Equal parts of cerate paste and vaseline, mixed, melted, and cooled quickly. The medication to be incorporated *secundum artem*.

GLUTEN PASTE.

Pure gelatin . . .	10 grammes
Distilled water . .	100 grammes

Soak and melt on water-bath. Add the yolk of one egg, mix well, heat for two hours on water-bath, and filter. Dilute to a thin liquid with sterilised water, and make alkaline with sodium carbonate. Use this preparation with 1 kilo-

gramme of ammoniated wax (cerate paste), mixing well and cooling. Again melt by heat and add ammonia to neutralise.

GLUTEN-CERATE CRÈME.

Gluten paste . . .	90 grammes
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Melt by heat and mix with

Zinc oxide . . .	9 grammes
Glycerin . . .	3 drops
Otto of rose . . .	2 drops
Solution of eosin . .	2 drops

PEPTONE PASTE.

Dried peptone . . .	15 grammes
Starch . . .	15 grammes
Zinc oxide . . .	15 grammes
Powdered gum acacia	30 grammes
Sterilised distilled	
water . . .	30 grammes
Lysol . . .	10 drops
Oil of citronella . .	10 drops

Make a paste.

STEARIN PASTE.

Made like cerate paste, but with stearin.

SERUM PASTE.

Finely powdered zinc oxide made into a thin paste with fresh ox-blood serum; paint on glass plates to scale, dry, powder, and sterilise by heating at 75° C. for twelve hours.

Mollin, or salve-soap (*sapo unguinosus*), is another basis prescribed by Dr. Unna. This is made by saponifying 40 parts of lard with potash (50 parts of a solution of sp. gr. 1.130 evaporated to 40 parts) and 4 parts of rectified spirit in the cold, then adding 15 parts of glycerin to the soft soap formed. Both liquids and solids to be taken by weight. The product contains 12 per cent. of free fat. The following are the more common combinations, the figures representing the quantities of the medicaments in 100 parts :—

Ammonium sulphhydrate	5	Oil of cade 20, and ichthyol	10
Camphor	5	Oleum rusci	10
Creolin	10	Peruvian balsam	10
Creosote	10	Potassium iodide	5 and 10
Ichthyol (ammonia)	5 to 50	(dissolved in as much water)	
Iodoform	10	Precipitated sulphur	10
Iodol	10	Thymol	10
Lanoline	20	Zinc oxide	10
Naphthol	1		

Dr. Unna's jelly application called *Gelanthum* is made by steeping tragacanth 3iiss. and gelatin 3ij. in water 10 ounces for twenty-four hours (keeping in a steam-bath). The paste formed is pressed through muslin, glycerin fl. 3vj. added, the whole heated on a water-bath for an hour, and made up to 12 ounces by weight with water in which $\frac{1}{4}$ grain of thymol is dissolved. *Gelanthum* is employed as a basis for medicaments.

Jellies for internal use are rarely prescribed for extemporaneous compounding, but it may be useful to state that for every 100 grammes of jelly 4 grammes of isinglass, 5 grammes of dry gelatin, 10 grammes of Irish moss, 15 grammes of Iceland moss, 10 grammes of starch, 3 grammes of salep, or 5 grammes of tragacanth is required. After boiling, skimming, and straining, jellies should stand for three hours in a cold place. Medicinal additions should be made to the strained or skimmed jellies while hot.

Copaiba, cod-liver oil, and castor-oil jellies are sometimes prepared by melting 5 or 6 parts of the oil or balsam with 1 part of spermaceti, and leaving to cool.

MIXTURES.

THE compounding of mixtures brings all the dispenser's wits into full play. It is here that medicines have the opportunity of combining with each other, because mixtures are in the large majority of cases aqueous solutions of inorganic or organic substances, hence the conditions are the best for interaction, water being the great promoter of chemical change.

In dispensing a mixture—as, indeed, in every other phase of the art of dispensing—the primary consideration should be to get a correct appreciation of the intention of the prescriber. This object should be kept in view particularly when dealing with a supposed error on the part of the prescriber, or with the necessity or otherwise of making any alteration in the prescription. Long experience, both in dispensing and of the habits of prescribers generally, alone confers the ability to decide a question of this kind; and no alteration should be made which will in any way change the therapeutic character of the medicine without first consulting the writer of the prescription. If this is impossible, the dispenser must be guided by his experience, following the line he would adopt if he purposed taking the medicine himself.

Having decided that the prescription is free from error, the next consideration is whether any chemical decomposition is likely to occur, and, if so, is it the prescriber's intention that such should be favoured or retarded? This point being settled, the prescription should then be dispensed in such a manner that the dosage from first to last will be practically uniform. The general rule to adopt is that chemical action among the ingredients of a prescription should be prevented or retarded as far as possible, unless the reverse is clearly ordered or intended by the prescriber.

In a great many instances the ingredients of a prescription

Salicin is soluble in 28 parts of water, and glycerin increases the solubility; therefore dissolve the salicin in 7 ounces of water slightly warmed, and add the glycerin and tincture when nearly cold.

In the following prescription gallic acid is present in excess of what the amount of water is capable of dissolving at the ordinary temperature :—

Acid. gallic.	. . . . .	℥v.
Acid. sulphuric. dil.	. . . . .	℥i.
Aquam	. . . . .	ad ℥vij.

Rub the gallic acid to a fine powder in a mortar, add the water and the sulphuric acid, and dispense with a 'shake the bottle' label. In this case the gallic acid dissolves with readiness in hot water, and some dispensers are apt to use such water, but the acid crystallises out on cooling.

Potassii chlorat.	. . . . .	℥ij.
Tr. pyrethri	. . . . .	℥j.
Aquam dest.	. . . . .	ad ℥vj.

Although the water alone would retain the chlorate in solution, the large amount of spirit present would cause it to crystallise out; the chlorate should therefore be finely powdered, and the bottle sent out with a 'shake' label.

There are other substances with which a similar plan must be followed if sufficient solvent is not prescribed with them—viz., *rub to fine powder and mix with the vehicle*. It has been observed that potassium chlorate, when present in mixtures in excess, slowly becomes crystalline, due to changes in temperature: when the temperature goes up a little more chlorate is dissolved, and when it goes down that little crystallises out again.

Sodii phosphat.	. . . . .	℥v.
Sodii salicylat.	. . . . .	℥iss.
Tr. chiratae	. . . . .	℥XL.
Glycerini	. . . . .	℥ij.
Aq. chlorof.	. . . . .	ad ℥vj.

Chloroform lessens the solubility of the salts, for, although the phosphate dissolves in 6 parts of water, it crystallises out

of this mixture if the temperature falls below 60° F. ; it should, therefore, be finely powdered, and no heat used to complete solution.

It is always convenient, if there are no chemical reasons to prevent it, to take the ingredients of a formula, especially where these are numerous, in the order in which they are written, and use, weigh, or measure them out in this order. It is less tax on the memory to know, when you have got so far among them, that you have used all the items previous to the one being weighed or measured ; and the prescriber who has any knowledge of dispensing generally writes them in this order. The following is a good example of the value of this rule :—

Ol. santali flav.	.	.	.	.	.	.	3ij.
Ol. copaibæ	.	.	.	.	.	.	3ss.
Tinct. cubebæ	.	.	.	.	.	.	3j.
Ol. menth. pip.	.	.	.	.	.	.	ʒ xij.
Spt. vini rect.	.	.	.	.	.	.	q.s. ut solv.
Tinct. buchu	.	.	.	.	.	.	3j.
Dec. pareiræ	.	.	.	.	.	.	3v.
Inf. uvæ ursi	.	.	.	.	.	.	3v.

To compound in the order written is the best way possible in such a case as this. Dissolve the first two oils in the tincture of cubebs, then the ol. menth. pip. in 2 drachms of rectified spirit ; add this to the first solution, then the tincture of buchu, and gradually and with smart shaking the decoction and infusion. If the last two are recently prepared, the mixture is much more presentable than when it is compounded with concentrated preparations.

We take another example, a prescription for a bronchitis-mixture which seems to present no difficulty :—

Ammon. carb.	.	.	.	.	.	.	3j.
Syrupi tolutani	.	.	.	.	.	.	3vj.
Tinct. tolutanæ	.	.	.	.	.	.	3iij.
Vin. ipecac.	.	.	.	.	.	.	3j.
Spt. chloroform.	.	.	.	.	.	.	3iij.
Inf. senegæ	.	.	.	.	.	.	ad 3xij.

Solve et misce.

Here the carbonate of ammonium must first be dissolved in the infusion, and for that purpose a mortar will be required, as the salt does not dissolve readily enough in aqueous menstrua to enable us to make the solution in a measure-glass with the aid of a glass rod, as might be done with bicarbonate of potassium, and in this case also shaking causes undesirable frothing. Having got the solution of ammonium carbonate in clear condition—say, about a couple of ounces of it—in the bottle, syrup of tolu comes second on the formula. But this should not be added now, because it would adhere to the glass, and we should not be able to measure the other ingredients accurately after it in the same graduate. The ipecacuanha wine should be added at this stage, but, before doing so, the solution should be diluted in the bottle with about 7 ounces more of the infusion. Now mix the spirit of chloroform and tincture of tolu, and pour them into the bottle, being careful to let the liquid fall into the middle of the solution, and not touch the neck or side; agitate by a little sudden jerking. In this way the tolu and chloroform will be equally diffused through the mixture. On adding the spirit of chloroform by itself to such a mixture, without shaking, the chloroform might separate and descend, and on pouring in the tincture of tolu by itself, without shaking, the resin would separate and float on the top. By having the resin of tolu held in solution by the additional quantity of alcohol of the spirit of chloroform, less separation takes place on addition to the mixture. In other words, a better emulsion will be made of the tolu than if the tincture had been poured in by itself. The syrup of tolu should now be added quickly, and the measure rinsed with more infusion—sufficient to make the required quantity of mixture. The bottle should then be gently shaken—not too much, or it will have a tendency to make the resin separate on the sides of the bottle.

A word of caution about infusions. When freshly prepared they should be allowed to become quite cold before being used for dispensing. Sometimes dispensers do not cool them, and if a hot infusion is used in this instance the heat partly volatilises

the ammonia, chloroform, and some of the spirit, and causes the resin of tolu to deposit on the sides of the bottle.

The rule in preparing such mixtures should therefore be : Make a solution of the salts first, using the vehicle, which is generally aqueous, as a menstruum ; strain into the bottle, dilute with more vehicle passed through the strainer, add the tinctures, or spirits, measuring small quantities first, shaking after each addition ; then add the syrup or any mixed preparation ordered ; lastly fill up with the vehicle, and shake again. Sometimes syrup of squill is ordered in such a mixture as the foregoing. In this case, the dispenser should mix the carbonate solution with the syrup of squill before adding any other ingredient, to prevent excessive frothing. If spirit of nitrous ether is also ordered, it should be mixed with the carbonate solution before tinctures and the like are added.

In the following another course has to be adopted :—

Ammon. carb.	.	.	.	.	.	.	gr. vj.
Vin. ipecac.	.	.	.	.	.	.	ʒij.
Vin. antim.	.	.	.	.	.	.	ʒij.
Syr. scillæ	.	.	.	.	.	.	ʒiij.
Syr. mori	.	.	.	.	.	.	ʒiv.
Aquam	.	.	.	.	.	.	ad ʒiiss.

There is so little aqueous menstruum here that, if the former course is adopted, effervescence is most persistent, and it may be an hour before the froth subsides. Powder the carbonate and, in place of adding the syrup of squill, take a proportionate quantity of acetum scillæ—viz., 78 minims—and put it over the carbonate in the mortar. When the effervescence has ceased, which is almost immediately, transfer the solution to the bottle, add the vin. ipec., vin. antim., and syr. mori, and make up to $1\frac{1}{2}$ ounce with simple syrup.

Another example is a mixture containing insoluble salts with tragacanth to suspend them. The great object in this is to give the patient in each dose of the mixture an equal quantity of each ingredient, having the solids suspended in it with the aid of the mucilage formed.

Bismuth. subnit.	. . . . .	ʒij.
Magnes. carb.	. . . . .	ʒj.
Acid. hydrocyan. (Scheele)	. . . . .	ʒvj.
Tr. capsici	. . . . .	ʒx.
Tr. opii	. . . . .	ʒiss.
Pulv. tragac. co.	. . . . .	ʒiss.
Aq. menth. pip.	. . . . .	ad ʒvj.

Misce.

Rub the three powders together in a mortar, then pour on 3 ounces of peppermint-water, gradually stir to form a uniform mixture, which should be transferred to the bottle, and the liquids added (the acid last) in the bottle, *not the mortar*, else loss of hydrocyanic acid will take place. The mortar is finally rinsed with a little more of the water, this poured into the bottle, and the quantity required to fill the bottle added. N.B.—*It is requisite in all cases that the dispenser should make up the measure exactly, not according to the bottle but by actual measure.*

Not infrequently dispensers put powders, such as bismuth and magnesia, into a bottle, and pour mucilage directly upon them, the result being that the powders are diffused in a lumpy condition. Powders ought always to be mixed with water in a mortar before adding mucilage. We remember a candidate at the Minor examination, who had a mixture containing powdered rhubarb and bicarbonate of sodium to dispense, giving in the mixture with the rhubarb floating on the surface in little balls! Had he carefully mixed the powders with water before pouring into the bottle, this would not have happened.

When fluids are to be mixed which decompose each other, or which may form combinations, the order of mixing may have a considerable influence on the condition and appearance of the mixture. Example :—

Liquor. ferri perchlor.	. . . . .	ʒij.
Mucil. acaciæ	. . . . .	ʒj.
Aquam destillatam	. . . . .	ad ʒviiij.

If the mucilage be added to the iron solution the two form a gelatinous mass, which will not make a clear solution with

the rest of the water. But a clear yellow solution is obtained if the liquor and mucilage are each first diluted with half of the water and then mixed, or if the liquor is mixed with all the water and the mucilage added last.

When vegetable substances, wholly or partly soluble in water, especially such as contain tannin or like constituents, have to be mixed with metallic or earthy salts, the rule is that both the vegetable substance and the salt should be separately dissolved in a large portion of the water and mixed. If a precipitate is formed it is then easily diffused by shaking.

CHEMICAL CHANGES IN MIXTURES.

It is not improbable that in almost every mixture dispensed chemical change of some kind takes place, either immediately or after a few hours or days have elapsed. There may be a precipitate or change of colour to make the interchange of molecules visible to the eye, or a decomposition may occur in which the products have the same physical characteristics as the original compounds. Even the simple solution of a single salt may involve dissociation, or perhaps chemical combination with the solvent, or some change due to the presence of the ubiquitous microbe may arise. The dispenser should be aware of all these changes, and know in each case whether the prescriber's intention is that the reaction should be accelerated or retarded.

In the great majority of cases involving chemical change it is desirable to retard or prevent the reaction as far as possible. This is usually accomplished by separately diluting the opposing ingredients and interposing any protective fluids (*e.g.*, mucilage, glycerin, or syrup) that may be ordered. They often prevent the occurrence of a precipitate, and usually retard chemical change.

Plumbi acetatis	.	.	.	.	.	.	℥j.
Tincturæ opii	.	.	.	.	.	.	℥ij.
Syrupi	.	.	.	.	.	.	℥vj.
Aquam	.	.	.	.	.	.	ad ℥viij.

Mix the tincture and syrup with 2 ounces of the water, and pour into the remainder of the water in which the lead has been previously dissolved.

Ext. cinchonæ liquid.	. . . . .	ʒij.
Ammon. carb.	. . . . .	ʒj.
Glycerin.	. . . . .	ʒss.
Aquam	. . . . .	ad ʒvj.

If the liquid extract be poured into a solution of the ammonium carbonate, a lumpy mixture results. The liquid extract should be stirred with the glycerin, and diluted to about 3 ounces ; then the carbonate of ammonium, dissolved in the remainder of the water, should be added.

The following was a favourite prescription of a consulting physician :—

Liq. ferri dialysati (Wyeth)	. . . . .	ʒiv.
Liq. arsenicalis.	. . . . .	ʒss.
Aq. dest.	. . . . .	ad ʒvj.

If the old-fashioned plan of ‘putting everything in first and then filling up’ be followed, a thick mixture will result. If, however, the dialysed iron be diluted with 4 ounces of the water, and the liquor arsenicalis mixed with the remainder and added gradually to the former solution, a beautifully bright mixture results.

Some mixtures are clear at first, and gradually throw out a precipitate, *e.g.* :—

Sodii bicarbonatis	. . . . .	ʒiss.
Liq. bismuthi et ammon. cit.	. . . . .	ʒi.
Aquam	. . . . .	ad ʒviiij.

This is clear at first, but slowly deposits bismuth carbonate. The presence of an excess of ammonium citrate retards the precipitation.

Some iron solutions deposit basic compounds on dilution :—

Syrup. ferri phosphatis	. . . . .	ʒj.
Aquam dest.	. . . . .	ad ʒviiij.

This remains a clear solution for a time, then begins to deposit basic phosphate of iron ; large excess of phosphoric acid completely prevents the change.

Tr. ferri acetatis	℥iv.
Liq. ammon. acetatis	℥xij.
Aquam	ad ℥vj.

This remains bright for several days, and then a copious deposit of ferric hydrate gradually appears, while the solution loses the deep-red colour characteristic of ferric acetate. An excess of acetic acid prevents the change.

These examples sufficiently illustrate the importance of carefully considering the order of mixing. It is useful to note the following :—

First, that where syrup, glycerin, honey, or mucilage is ordered along with fluids which decompose each other or which produce unsightly combinations, it is highly probable the prescriber has anticipated this result, and added this particular ingredient to avoid or mitigate the evil. Glycerin has in many cases a powerful influence in preventing decompositions, as well as in preventing depositions; syrup, less so; while honey and mucilage are favourable to fine division and suspension of insoluble salts and organic matter.

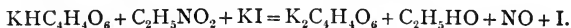
Second, that where any alteration takes place producing unsightly mixtures, as in the case of resinous solutions, the best result is obtained by pouring the tincture through a dry funnel into the bottle containing all the other ingredients.

Third, in no case should liberties be permitted in the shape of additions to or subtractions from prescriptions, with a view to producing what is called 'elegant pharmacy.' Cases where such expedients are necessary are very rare, and even in these the error is generally due to oversight on the part of the prescriber, and is so apparent that the dispenser cannot possibly have any difficulty in the matter.

A common case of chemical incompatibility is in prescriptions containing potassium iodide and spirit of nitrous ether :—

Potassii bitart.	℥j.
Potassii iodidi	℥j.
Spt. ætheris nitrosi	℥iv.
Syr. aurantii	℥j.
Aquam	ad ℥x.

This mixture cannot be dispensed without reaction between the potassium bitartrate and iodide and spirit of nitrous ether, iodine and nitric oxide being liberated, thus :—



If the dispenser can communicate with the prescriber, he should inform him that the mixture will contain free iodine, and also that it will not contain a particle of nitrous ether ; if consultation is impossible, proceed as follows : Dissolve 1 drachm of cream of tartar and 8 grains of potassium iodide in 4 ounces of water contained in a mortar ; add the spirit of nitrous ether, stir briskly, so that the gas may escape, and allow to stand for half an hour in order to get rid of the nitrous fumes entirely. Then make up the rest of the mixture and add it to the contents of the mortar. The object of this procedure is to limit the action of the nitrous ether, for while theoretically the 4 drachms will liberate the iodine from about 8 grains only of iodide, the liberated nitric oxide on coming into contact with air is changed to higher oxides, which are capable of decomposing iodide, so that if the mixture were made up in a 10-ounce bottle, iodine would continue to be liberated, until the whole of the iodide of potassium was decomposed.

Certain vegetable infusions, especially *inf. uvæ ursi*, *inf. senegæ*, *inf. scoparii*, and *inf. caryophylli*, react with *spt. æther. nit.*, and the nitric oxide eliminated plays the part of an oxygen-carrier, with the result that unexpected decompositions occur, gases accumulate in the mixtures, colours change, and bottles burst. This is due to reaction between tannin and nitrous ether, a statement which one investigator proved by detannating the infusion in mixture A before mixing with spirit of nitrous ether, when no decomposition occurred :—

A.	B.
Tr. digitalis . . . ʒj.	Tr. scillæ . . . ʒiv.
Tr. hyoscyami . . . ʒj.	Spt. ætheris nit. . . ʒviiij.
Spt. æther. nit. . . ʒiv.	Inf. scoparii conc. . . ʒxvj.
Inf. caryoph. . . ad ʒvj.	Aquam . . . ad Oiv.

The stock mixture B gave no trouble on two occasions, but

afterwards emitted nitrous fumes, blew out the cork, and formed a brown deposit. It is obvious from the nature of nitrous ether that in presence of an acid and vegetable matter of any kind changes such as these may be expected, whether tannin is present or not. Mixtures which are liable to evolve gases when bottled should always be made in a measure and not transferred to the bottle until effervescence ceases. If required to be delivered at once, the customer should be instructed to loosen the cork of the bottle on reaching home. To obtain uniform results in such mixtures it should be borne in mind that freshly made infusions must be used. Concentrated preparations of drugs such as cloves and broom, however well prepared, vary with different makers, and one make does not give the same results as another so far as appearance is concerned.

It frequently happens that chemical changes take place in mixtures which are quite unexpected by the prescriber and dispenser. Thus mixtures containing *tr. nucis vom.* and *spt. ammon. arom.* gradually become, as a rule, greenish blue in colour, this change being most probably due to the presence in *nux vomica* of a nuclein compound of copper. *Igasuric acid* (a constituent of the drug) also becomes green with ammonia, but copper only accounts for the blue colour (see *C. & D.* 1905, II. 888 and 917). The change also occurs in mixtures of bismuth solution and tincture of *nux vomica*, and the following (A) becomes bluish violet in one day :—

A.	B.
Magnesii sulphatis . . . ʒiv.	Sodii bromid. . . . ʒiv.
Tinct. nucis vomicæ . . . ʒij.	Ammon. carb. . . . ʒj.
Spt. ammon. arom. . . . ʒiij.	Tr. chlorof. co. . . . ʒij.
Spt. æther. nitrosi . . . ʒiij.	Aquam ad ʒviiij.
Aquam ad ʒviiij.	

In a few hours B mixture becomes colourless, and throws down a considerable brown precipitate. If the bromide be omitted, the same change takes place, but the brown compound remains in solution instead of being precipitated. The change is due to the action of the ammon. carb. on the

cochineal-colouring of the tr. chlorof. co. It may be noted that the alkaloid in liquid extract and tincture of nux is not so easily precipitated by alkalies as is liq. strych. (p. 291).

Tincture of nux vomica, owing to the igasuric acid which it contains, is very apt to change colour when mixed with nitric acid or nitro-muriatic acid. For instance—

Acid. nitrici dil.	.	.	.	.	.	3iv.
Aquæ destillat.	.	.	.	.	.	3vj.
Tinct. nucis vomicæ	.	.	.	.	.	3ij.

If mixed in the order written, the mixture soon becomes yellow-coloured and acquires an odour of nitrous acid ; if the order be reversed, neither colour nor odour is developed. Various results are produced by mixing part of the water with the acid and part with the tincture. A red or reddish-yellow colour develops in course of time, but is ultimately discharged. This applies particularly to nitro-muriatic acid and nux vomica mixtures. Somewhat analogous changes take place in the following mixtures :—

I.				II.			
Sodii salicyl.	.	.	3ij.	Pot. bicarb.	.	.	3ij.
Sodii bicarb.	.	.	3ij.	Sodii salicyl.	.	.	3iss.
Tr. nuc. vom.	.	.	3ij.	Vin. colchici	.	.	3iv.
Aq. chloroform.	.	ad	3viiij.	Aquam	.	.	ad 3viiij.

No. I. became black in forty-eight hours, while No. II. assumed a colour almost like compound tincture of cardamoms in the same time. It is a matter of common observation that aqueous solutions of alkaline salicylates become of a reddish-brown colour on exposure to light, apparently due to the oxidation-products of salicylic acid being accompanied by coloured bodies. Stock solution of the bicarbonate induces the coloration more readily than the bicarbonate itself, owing to the solution containing carbonate. Natural salicylic acid and the physiologically pure artificial acid, and salicylates made from them, are not so liable to change. With impure salicylate the change is much more rapid ; but the purest 'artificial' salicylate stands the test quite as well as that made from 'natural' salicylic acid. The coloration is still further post-

poned by using distilled water containing carbonic acid in solution (*i.e.*, plain aerated water).¹

III.				IV.			
Sodii salicylat. (natural)	.	.	3ij.	Sodii salicylat.	.	.	3iiss.
Spt. ammon. co.	.	.	3iv.	Spt. æther. nit.	.	.	3iv.
Spt. chlorof.	.	.	3ij.	Liq. ammon. acet.	.	.	3j.
Tr. nucis vom.	.	.	3j.	Aquam	.	.	ad 3vj.
Aquam	.	.	ad 3vj.				

No. III. mixture changes very rapidly, for in a few hours it is deep orange in colour, and a day after it is greatly intensified, finally becoming deep blackish brown. Sodium salicylate and spt. æther. nit. produce a red colour, forming nitro- and diazo-oxybenzoates of sodium, which do not seem to be harmful. No. IV. has frequently been dispensed. Although the spirit was neutralised, the mixture rapidly coloured, and in a few hours it was of a brilliant deep orange tint. See also page 279.

INTENTIONAL CHEMICAL ACTION.

Saline Mixtures.—In many prescriptions chemical action is intended, as in the case of saline mixtures, which are extemporaneously prepared solutions of the alkaline acetates, citrates, or tartrates. For example :—

Potass. bicarb.	.	.	.	.	.	.	3ij.
Ammon. carb.	.	.	.	.	.	.	3ss.
Acid. citric.	.	.	.	.	.	.	3ij.
Syrup.	.	.	.	.	.	.	3ss.
Aq.	.	.	.	.	.	.	ad 3vj.

Here the prescriber intends the mixture to contain carbonic-acid gas in solution. To get this, powder the carbonate of ammonium and dissolve it and the bicarbonate of potassium in the mortar in 5 ounces of water ; add the acid, stir, allow the effervescence to pass off, strain the solution into the bottle,

¹ Experiments by Greenish and Beesley on solutions of sodium salicylate and sodium bicarbonate tend to show that the presence of sodium sesquicarbonate in sodium bicarbonate is the cause of the coloration, also that absorption of oxygen acts by forming some sesquicarbonate. A grain of sodium hyposulphite per oz. of mixture prevents coloration, and sodium sulphite and bisulphite are equally effectual, as also is formaldehyde.—*C. & D.* 1915, i. 231.

add the syrup to the bottle, make up, and quickly cork. The mixture will not effervesce, but it will have the fresh taste of the free carbonic acid which it contains.

Effervescing Mixtures distinct from the foregoing are frequently ordered by medical men, the usual method being to prescribe an alkaline mixture and acid powders, although there are cases in which an alkaline and an acid mixture are sent out together. It is important that the directions should be quite explicit. It sometimes happens that the prescriber leaves the dose of acid to the discretion of the dispenser; if this should occur, the dispenser may put in a slight excess of acid: it improves the taste in most cases. The following are examples of this class of mixture:—

	Ferri et ammon. cit.	ʒj.
	Acid. citric.	ʒij.
	Aquam	ad ʒvj.
M.	Sig. : No. 1.	
	Potass. bicarb.	ʒiij.
	Syr. limonis	ʒj.
	Aquam	ad ʒxij.

M. Sig. : No. 2.

One tablespoonful of No. 1 to be taken with two tablespoonfuls of No. 2 twice a day, &c.

It may appear that the prescriber has erred in placing the syrup of lemon in the alkaline mixture, thereby neutralising it, but it will be observed that there remains after the doses are mixed a slight excess of citric acid—viz., $1\frac{1}{2}$ grain in each dose.

Prescribers of effervescing mixtures occasionally err in regard to compatibilities, as the following example shows:—

	Liquoris strychninæ hydrochloridi . . .	ʒiss.
	Sodii bicarbonatis	ʒiiss.
	Aquam	ad ʒvj.
Fiat mistura.	Sig. : No. 1.	
	Acidi citrici	ʒiv.
	Tincturæ calumbæ	ʒiv.
	Aquam	ad ʒvj.

Fiat mistura. Sig. : No. 2.

ʒss. of No. 1, with ʒss. of No. 2, to be taken effervescing at 12 noon and 4 P.M.

To avoid strychnine being precipitated as hydrate in No. 1, the dispenser put the liquor in No. 2 mixture. Alkaloids should always be put in the acid mixture, and if the acid is prescribed in powders in such cases and the alkaline bicarbonate in solution, the dispenser should reverse the order and indicate the change on the prescription.

Sodæ tartaratæ	.	.	.	.	.	.	ʒvj.
Sodii bicarb.	.	.	.	.	.	.	ʒiij.
Vin. antim.	.	.	.	.	.	.	ʒiss.
Syr. aurant.	.	.	.	.	.	.	ʒj.
Aquam	.	.	.	.	.	.	ad ʒviiij.

Sig. : ʒj. 4tis h. ex aq.

Pulv. acid. tart. q.s. [20 gr.]

Tales viij. Sig. : j. with each dose of the medicine.

The directions should be : 'Two tablespoonfuls (by measure-glass) every four hours, in water. Add one of the powders, and drink during effervescence.'

The following mixture is an unusual one, and gave rise to some trouble :—

Sodii bicarb.	.	.	.	.	.	.	ʒvss.
Tr. opii	.	.	.	.	.	.	ʒxx.
Aq. menth. pip.	.	.	.	.	.	.	ad ʒviiij.

The Alkaline Mixture.

Acid. citric.	.	.	.	.	.	.	ʒiv.
Bismuth. subnit.	.	.	.	.	.	.	ʒviiij.
Acid. hydrocy. dil.	.	.	.	.	.	.	ʒxij.
Aq.	.	.	.	.	.	.	ad ʒiv.

The Acid Mixture.

The mixture was taken every two hours the first day, and was all right, but on standing over night the last dose had practically lost all its effervescence. The repeat mixture was given twice a day, and after about two doses the same thing occurred—viz., effervescence had ceased. Compound tragacanth powder ʒss. was used to suspend the bismuth subnitrate. The acid mixture is on the lines of a process for making bismuth citrate. The citric acid enters into combination with the bismuth, which, suspended in the mixture by means of compound powder of tragacanth, is in a condition most favourable for obtaining completion of the reaction in a short time ;

hence the rapid deterioration in the production of effervescence. A little free nitric acid is liberated, but it is insignificant and equivalent to the citric acid. The prescriber was recommended to order bismuth carbonate and put it into the alkaline mixture.

SATURATION EQUIVALENTS.

In round numbers, for purposes of prescribing and dispensing.

Acidum citricum . . .	20	19	17	14	10	17	24	30
Acidum tartaricum . . .	22	20	18	15	11	18	26	32
Potassii carbonas . . .	24	22	20	16	12	20	28	35
Potassii bicarbonas . . .	29	27	24	20	14	24	34	42
Sodii carbonas . . .	40	38	35	28	20	34	49	60
Sodii bicarbonas . . .	24	22	20	17	12	20	29	36
Animonii carbonas . . .	17	16	14	12	8	14	20	25
Magnesii carbonas . . .	14	13	11	9	7	11	16	20

This table (compiled by the late Dr. John Attfield, F.R.S.) is read thus : 20 grains of citric acid will saturate 29 grains of bicarbonate of potassium ; 20 grains of bicarbonate of sodium will saturate, or be saturated by, 18 grains of tartaric acid ; 11 grains of tartaric acid = 8 grains of carbonate of ammonium ; 20 grains of bicarbonate of sodium is equivalent to, or will do as much work as, 34 grains of carbonate of sodium ; 14 grains of citric acid is as strong as 15 grains of tartaric acid. It is occasionally convenient to double the numbers, halve them, or take some other proportion ; also to employ them in weights other than grains.

Lemon-juice contains, on an average, 35 grains of citric acid in 1 fluid ounce, or $4\frac{1}{2}$ grains (nearly) per fluid drachm.

Chlorinated Solutions containing chlorate of potassium, hydrochloric acid, and water are frequently prescribed for scarlatina, and other disorders in which the throat is affected. The object is to make a solution of chlorine according to the old method of the late Mr. Beamish, Covent Garden, viz. :—

Sodii chlorid.	5ij.
Potass. chlorat.	5ij.
Acid. hydrochl. pur.	5iv.
Aquam destillat.	ad 5ij.

M. Ft. guttæ secund. art.

After the chlorine has been developed, it is well to add about a fluid ounce of the water and shake well to absorb the chlorine.

If the water be poured in right away, a large quantity of the gas is simply displaced and escapes from the bottle. The chlorine is likewise liberated in a dilute solution, but, of course, more gradually, and for this reason it used to be thought that it is intended that chlorine should be slowly liberated.

MIXTURES BECOMING GELATINOUS.

We have already referred to the fact that some kinds of distilled water become perfectly gelatinous on keeping. The same thing takes place with some kinds of mixtures. The following are cases which have been observed by correspondents of *The Chemist and Druggist* :—

Tinct. hamamelidis	℥ XL.
Ext. ergotæ liq.	ʒj.
Spt. æther. chlor.	ʒj.
Syr. papav. alb.	ʒij.
Tr. nuc. vom.	℥ XL.
Aquam	ad ʒviiij.

Two days after this mixture was dispensed it was returned a perfectly gelatinous mass. It had every appearance of a perfect mixture when sent out, and remained so for about twelve hours, when it changed in colour from almost transparent brown to opaque pink, and became thick and ropy. A mixture containing syr. pap. alb. and syr. scillæ became ropy and of a pink colour when made with old syr. papav., but when made with fresh syrup it kept all right.

Such changes are by no means uncommon, and cannot as a rule be forecast. They are due to one of two micro-organisms—*Bacillus viscosus sacchari*, Kramer, which acts in neutral or slightly alkaline solutions containing sucrose, albuminoids, and mineral salts, or *B. viscosus vini*, Kramer, which grows in acid solutions containing glucose, albuminoids, and mineral salts. In the process of growth the bacilli set up fermentation and produce a viscous substance, $C_6H_{10}O_5$, which has all the characters of metamorphosed cellulose, and is precipitated by alcohol. The fermentation takes place in mixtures containing less than 20 per cent. of alcohol. It is precisely the same thing that occurs in ropy ginger-beer. The bacilli doubtless exist in

one or other of the galenical preparations, and only require the needful conditions of growth for development. Ergot preparations are especially prone to set up the fermentation.

QUININE MIXTURES.

Quinine salts give rise to so many curious complications when dispensed in mixture form that some special remarks are necessary regarding them. The complications usually arise from ignorance of the peculiarities of the alkaloid, whose salts have a wide range of solubility, and our remarks in regard to them largely apply to other alkaloids. On page 70 the chemical and physical properties of quinine salts are given, from which it will be seen that the acid salts of quinine are much more soluble in water than the basic salts. Messrs. Howards & Sons, Ltd., publish a useful dispensing-counter table showing the percentage of alkaloid in each salt, its solubility, and the equivalent value to one of sulphate. As regards the last, the following may be noted :—

Sulphate	1'00	Valerianate	1'01
Hydrochloride	0'9	Lactate	0'94
Bihydrochloride	1'02	Salicylate	1'05
Hydrobromide	0'96	Hydrochloro-sulphate	0'99
Bihydrobromide	1'23	Arsenate	1'06
Bisulphate	1'24	Tannate	3'67
Phosphate	0'96		

As to the solution of quinine sulphate in acids, the fact that the mineral acids, strong or dilute, make presentable pill-masses with quinine salts indicates that an acid should not be poured direct upon any salt, but that the salt should be well diffused in water before the acid is added. Very often, however, no acid is ordered in the prescription. In such a case it is extremely unwise to depart from the letter of the physician's order. The only admissible manner of compounding is to reduce the quinine salt to fine powder and diffuse it in the liquids. In some cases, as when spirit of ether is an ingredient, the quinine tends to adhere to the bottle, but this may be avoided by the addition of a little mucilage of acacia to the mixture. Some dispensers advocate that the quinine

should be dissolved in such circumstances, and the view is one for which there is much to be said; but quinine in solution is more bitter than when in suspension, and this fact throws the balance of opinion in favour of the suspension method.

The greater number of difficulties with quinine mixtures occur through the precipitation of the quinine after it has been brought into solution. The simplest of these, apart from those due to ordinary alkaloidal precipitants, are caused by the formation of less soluble salts, owing to double decomposition—for example, in the case of ammonium-acetate solution and a solution of sulphate of quinine there is double decomposition, and the quinine acetate formed is rapidly hydrolysed, with the result that quinine hydrate crystallises out in bulky acicular crystals. Such mixtures sometimes become quite solid, and this was considered to be due to insoluble quinine acetate until Messrs. Kidd and Hill demonstrated the hydration (*The Chemist and Druggist*, 1899, II. 1073; 1900, I. 664). Salicylates also form sparingly soluble compounds with soluble quinine salts.

The amount of any pharmacopœial dilute mineral acid required to dissolve quinine sulphate is reckoned as 1 minim for each grain of sulphate. As a rule this holds good and provides permanent solutions if no body is present which reacts with the soluble quinine salt to form a less soluble one, or if the soluble salt is not ‘salted out.’

Quininæ sulphatis	℥j.
Acid. hydrobromic. dil.	ʒj.
Glycerini	ʒj.
Potassii bromidi	ʒj.
Ætheris chlorici	ʒij.
Aquam	ad ʒviiij.

M.S.A.

This formed a perfectly clear mixture at first, but in a few minutes quinine sulphate began to separate in silky crystals, the amount of sulphate being the surplus unconverted into hydrobromide and insoluble in the liquid.

The most unmanageable mixtures are those in which alkaloidal precipitants are present. The more common of these associated with quinine in prescriptions are the alkaline

carbonates and hydrates, iodides and iodine, perchloride of mercury, and infusions or tinctures containing tannin. In all circumstances these substances precipitate quinine as insoluble compounds, which in most cases are adhesive. The alkaline hydrates and carbonates precipitate quinine as hydrate, and there is no means of avoiding the precipitation. Prescribers appear to be fonder of ordering the alkalies—generally in the form of aromatic spirit of ammonia—with citrate of iron and quinine than with the plain salts of quinine, probably under the impression that the double salt is not affected by the alkali. Ammoniated tincture of quinine (in which the alkaloid exists as hydrate dissolved in alcohol) is sometimes prescribed along with water, the result being that quinine hydrate is precipitated. Examples of such cases are given in the following pages, and it will be seen that the addition of mucilage is recommended, this being all that is necessary to diffuse the precipitated quinine permanently in the mixture instead of letting it adhere to the bottle.

Iodide of potassium forms different compounds with quinine salts, the difference depending upon the other ingredients of the mixture. Neutral solutions of quinine sulphate and potassium iodide do not react chemically, but the presence of free acid invariably induces a chemical change, and this is accentuated if there is any substance in the mixture which liberates iodine, such as nitric acid or spirit of nitrous ether. Once an alkaloid in solution comes into contact with free iodine all hope of a satisfactory mixture is gone. In such cases the dispenser should, if possible, communicate with the prescriber, so as to suggest the exclusion of the oxidising body; failing that, the reaction between the alkaline iodide and the oxidising body should be carried out with the minimum quantity of iodide, the rest of the iodide being mixed with the quinine and a little mucilage before the iodine solution is added to it. Double iodides, such as *liquor arsenii et hydrargyri iodidi* (Donovan's solution), precipitate alkaloids at once; the same is the case with perchloride of mercury, the precipitates being heavy and poisonous, therefore dangerous. Glycerin has a wonderful inhibitive influence in such cases. A few years ago it was shown, as the result of a

long research, that many chemical reactions are retarded, and in some cases prevented, by glycerin, sugar, and gum. Long before that (*viz.*, in 1881) the late Mr. William Martindale had proved before the Pharmaceutical Society the inhibitive influence of glycerin in the following case :—

Hydrargyri perchloridi	gr. ij.
Potassii iodidi	ʒij.
Spiritus chloroformi,	
Tincturæ cinchonæ	aa. ʒj.
Quininæ sulphatis	ʒss.
Aquæ	ʒij.

M.

The first two ingredients form potassio-mercuric iodide, the well-known alkaloidal precipitant, so the mixture would not 'go' at all. After many trials, Mr. Martindale produced a solution by using $1\frac{1}{2}$ ounce of glycerin in place of as much water. The quinine sulphate was rubbed with the glycerin, the iodide added and dissolved, then the tincture and spirit, and lastly the perchloride dissolved in $\frac{1}{2}$ ounce of water. The precipitate formed on the last addition was immediately redissolved, and the mixture was turned out slightly opaque, owing to the resinous matter in the tincture of cinchona. Galenical preparations containing tannin, especially the acid infusion of roses, are troublesome when prescribed along with quinine salts, and require special treatment. Many of the difficulties with quinine mixtures are amenable to the two rules which should be observed, *viz.* :—

1. Chemical reaction should be effected in the most dilute solutions; and
2. A means for the proper apportioning of the dose should be adopted. For this purpose mucilage of acacia is not only generally suitable, but it has been shown to retard or modify chemical action.

We now give a number of prescriptions which have actually been met with at the dispensing-counter.

With Acetates quinine salts yield a precipitate of quinine hydrate in feathery crystals if the proportion of the alkaloidal salt is greater than 1 grain in 3 ounces of aqueous mixture.

With Carbonates or Hydrates quinine frequently forms a troublesome precipitate which requires careful management. The best result is usually obtained by diluting, as far as possible, the incompatible solutions *before* mixing. This method answers with the following:—

Tr. quininæ	℥j.
Ammon. carb.	℥j.
Aquam	ad ℥xij.

But if the tincture be poured into a strong solution of the carbonate, the alkaloid separates in flocks, which adhere to the sides of the bottle.

Quininæ sulph.	℥ij.
Spt. ammon. arom.	℥vj.
Aquam	ad ℥vj.

Mixed in whatever manner, the precipitated quinine adheres in lumps. A good mixture was, however, obtained by using a proportionate quantity of pure quinine instead of sulphate; this was diffused through a portion of the water, and the diluted sal volatile added.

Quininæ sulph.	gr. xvj.
Spt. ætheris	℥ij.
Spt. ammon. arom.	℥iv.
Tr. opii	℥xxx.
Aquam	ad ℥viiij.

The plan to follow in this case is to rub the quinine to fine powder in a mortar, and mix it with 7 ounces of water; add the sal volatile, shake well, then add the rest of the ingredients and sufficient water to make up to 8 ounces.

With Benzoates.—Quinine benzoate is a sparingly soluble salt (see page 70) and may be formed by interaction, as in the following case:—

Sodii benzoatis	gr. 144
Liquoris strychninæ (1885 B.P.)	℥xlviij.
Tincturæ quininæ	℥iss.
Glycerini	℥j.
Infusi aurantii	℥vj.

Here the sodium benzoate and quinine salt in the tincture interact, quinine benzoate being precipitated, and at the same time the acid in the strychnine solution liberates a little benzoic acid from the sodium benzoate.

With Bicarbonates.—When these are ordered with quinine in a prescription, the bicarbonate should be dissolved in the water, and the quinine rubbed to a fine powder and suspended in the liquid. The addition of a little mucilage has the effect in these cases of suspending the quinine and preventing it from adhering to the sides of the bottle.

With Chlorine, quinine salts generally yield yellow solutions. A familiar example of this is the late Dr. Burney Yeo's mixture (No. I.) :—

I.	II.
Potassii chloratis . . . ʒss. Acid. hydrochlor. . . m℥xl. Quininae sulphatis . . gr. xxiv. Syr. aurantii . . . ʒj. Aquam . . . ad ʒxij. M.S.A.	Quinin. sulphat. . . gr. xxiv. Acid. nitric. dil. . . ʒiij. Spt. æther. nit. . . ʒiij. Spt. chloroform. . . ʒij. Potass. chlorat. . . ʒss. Aq. camph. . . ad ʒvj. M.

If No. II. is dispensed in the order given, the mixture becomes of an intensely yellow colour. It is colourless if dispensed as follows: (1) Mix the quinine sulphate with 2 ounces of camphor-water, and add the dilute acid and spirit of nitre; (2) dissolve the chlorate in 2 ounces of camphor-water, add the spirit of chloroform, mix with the quinine, and make up. Both the ethyl nitrite and the potassium chlorate appear to take part in the coloration, chlorine being liberated from the chlorate by the acid, and the fact that a few drops of ammonia added to a little of the mixture gives the green colour peculiar to thallioquin, while the same colour is produced as in the Burney Yeo mixture, shows that the chlorine is responsible for the coloration. It would, however, be wrong to assume that a chlorine derivative of quinine is formed, as it is far more likely that an oxidation-product results, cinchona alkaloids being prone, under certain conditions of oxidation, to yield a

chinoline-carboxylic acid, which is of a yellow colour. These mixtures might repay chemical investigation, and it will be useful for those interested in that direction to refer to *The Chemist and Druggist*, 1897, 1. 136, for reports on different methods of dispensing No. II. mixture.

With Iodides.—Prescriptions containing quinine sulphate and potassium iodide are not uncommon, and precipitation can rarely be avoided for the reasons given on page 75. Even when just sufficient acid is added to dissolve quinine sulphate precipitation frequently occurs owing to the presence of a trace of iodate in the iodide. A few examples are here given of other quinine and iodide combinations.

Liq. ferri iodidi	℥ss.
Syr. ferri hypophosph.	℥j.
Quininæ phosph.	℥ij.
Acid. phosph. dil.	℥ss.

The liquor (1 to 7) added to a solution of the quinine in the acid gives a copious finely divided precipitate of 'quinine iodide,' but if the syrup be added *before* the liquor, a clear solution is obtained, from which the quinine iodide gradually crystallises. The former method should be adopted. Note the solubilities of the iodides (page 70).

The amount of acid used to dissolve the quinine exerts a certain influence on the nature of the precipitate formed, as in the following :—

Quininæ sulphatis	gr. xxiv.
Acid. nitric. dil.	q.s.
Potassii iodidi	℥ij.
Aquam	ad ℥vj.

By using just sufficient dilute acid, mxxv., to dissolve the quinine, a yellow precipitate of iodide of quinine is formed ; but if a large excess of acid be added, it liberates iodine from the potassium iodide, and the liberated iodine combines with the sulphate of quinine to form the insoluble iodosulphate of quinine, or herapathite, which is gradually deposited as a greenish-brown sediment.

In some cases of this kind it is not herapathite which is

formed, but a brown compound of sulphate of quinine, iodide of quinine, and iodine. This is especially the case with mixtures containing quinine sulphate, potassium iodide, and spirit of nitrous ether, such as the following:—

A.	B.
Quininæ sulph. . . gr. xxx.	Potassii iodidi . . gr. xx.
Potassii iodid. . . gr. xx.	Ammon. chloridi . . ʒss.
Spt. ammon. arom. . ʒvj.	Quininæ hydrochlor. . gr. xvj.
Spt. æther. nit. . ʒiv.	Acid. hydrochlor. dil. . q.s.
Tinct. zingib. . ʒiij.	Glycerini . . ʒiv.
Aq. . . ad ʒvj.	Spt. æther. nit. . ʒiv.
	Syrup. mori . . ʒvj.
	Aquam anisi . . ad ʒviij.

Numerous futile attempts were made to combine mixture A in a presentable manner; the prescriber being near, he was consulted, and gave directions to dispense the iodide and sal volatile in a separate mixture. The writer of prescription B was interviewed. He was quite aware that iodine might be liberated in his mixture, and on being informed that the whole of the iodine would be freed and that it would precipitate the quinine as an iodo-compound, he suggested the addition of enough acid to dissolve it. Learning, however, that chemistry would not accommodate him in this manner, he directed the addition of 1 ounce of mucilage to suspend the precipitate. The mixture was therefore dispensed in this way, and produced a reddish-brown, muddy compound evolving nitrous fumes. The mixture was never repeated.

The Bromides form perfectly clear mixtures with quinine, as the quinine hydrobromides are amongst the most soluble salts of the alkaloid. The following gives a clear mixture:—

Quininæ bromidi ʒij.
Acid. hydrobromici (medic.) . . . ʒiij.
Spt. ætheris chlorici ʒvj.
Tinct. lavand. co. ʒj.
Aq. destillat. ad ʒviij.

Dissolve the quinine hydrobromide in 4 ounces of water, and add to it the chloric ether. Mix the tincture, acid, and 2 ounces

of water together, and filter into the quinine solution, if an absolutely clear mixture is desired. Sometimes precipitates are induced by salting out, as in the following instance :—

Potassii iodidi	3j.
Potassii bromidi	3vj.
Acidi sulphurici diluti	3j.
Quininæ sulphatis	gr. xxxvj.
Tincturæ aurantii	3vj.
Aquam	ad 3vj.

M.

When the quinine sulphate is dissolved in the water and acid, and the potassium salts are added, a quinine salt separates in white flocks, but there is no precipitation if the potassium salts are dissolved in 3 ounces of water and the quinine sulphate in 2 ounces with the acid and tincture, then mixed. There is such a thin partition, as it were, between solubility and precipitation that little is required to break through it. Apart from that, it is always bad compounding to add a solid salt to a solution of another salt.

With Ferric Chloride.—Solution and tincture of perchloride of iron are commonly compounded with quinine sulphate for retail purposes, but not so frequently prescribed. The sulphate is readily soluble in either liquid. Quinine sulphate is much more soluble in tinct. ferri perchlor. than in liq. ferri perchlor., owing to the alcohol contained in the former. The amount of acid in both preparations is insufficient (in the doses generally given) to account for the solubility, and interaction between the quinine sulphate and ferric chloride appears to take place, as in the first of the following :—

I.	II.
Quinin. sulphat. . . gr. xxiv.	Quin. sulph. . . gr. xvj.
Magnes. sulphat. . . 3ss.	Tr. ferri perchlor. . . 3iij.
Tr. ferri perchlor. . . 3j.	Spt. chlorof. . . 3j.
Aquam chlorof. . . ad 3vj.	Glycerin. . . 3ss.
Fiat mistura.	Aq. . . ad 3viiij.
	Misce.

No. I. mixture is muddy in appearance as soon as compounded,

and this is generally attributed to the precipitation of 'ferric oxychloride.' There are many compounds which go by that name ; some are soluble (*e.g.*, $\text{Fe}_2\text{Cl}_6 \cdot 10\text{Fe}_2\text{O}_3$), others (all hydrated) insoluble. In such a mixture as No. I. the formation of $\text{Fe}_2\text{Cl}_6 \cdot 10\text{Fe}_2\text{O}_3$ from $11\text{Fe}_2\text{Cl}_6$ is induced by the greediness of the quinine for a solvent, and the reaction gives it 60HCl ; but once the equilibrium of the ferric chloride is disturbed, the hydration process goes on to the precipitation-point, and is not restored until some free acid is added. Twenty-four minims of dilute hydrochloric acid suffices to keep the mixture perfectly bright. No. II. mixture was muddy when dispensed with tap-water (containing earthy carbonates), and clear with distilled water. The muddiness was due to ferric hydroxide. A similar precipitate to No. I. might be expected in No. II., but it will be observed that the amount of tincture is larger, and the glycerin retards precipitation. Mixtures of this class should either be prescribed with quinine hydrochloride or, if the sulphate is desired, each grain of it should have a single minim of dilute hydrochloric acid (or dilute nitric acid) ordered along with it, and the quinine salt should be got into solution before the ferric-chloride preparation is added. It is well to note that ferric chloride in solution is unstable, especially in presence of alcohols, and numerous changes are possible in mixtures containing it and organic substances, such as the precipitation of ferric hydroxide and reduction of part of the chloride to ferrous chloride. Light plays a part in the precipitation, and to prevent this we know nothing better than the use of a minim of acid. nitric. dil. for each grain of quinine sulphate in the mixture. The nitric acid is better than hydrochloric acid, as it helps to keep the iron ferric.

With Mercuric Chloride.—Quinine salts are not compatible with mercuric chloride except under certain conditions, such as the absence of free acids. Mercuric chloride is an alkaloidal precipitant, but the precipitates formed are usually dissolved by hydrochloric acid, as in the next example.

Barii chloridi	. . . . .	gr. j.
Calcii chloridi	. . . . .	gr. 72
Quininæ hydrochloridi	. . . . .	gr. 96
Liquoris arsenici hydrochlorici	. . . . .	℥96
Liquoris hydrargyri perchloridi	. . . . .	ʒij.
Acidi hydrochlorici diluti	. . . . .	ʒiss.
Aquam destillatam	. . . . .	ad ʒvj.

The best way to compound this is to dissolve the quinine hydrochloride in 2 ounces of water and 1 drachm of the dilute acid, and add to the liq. hydrarg. perchlor. ; dissolve the barium and calcium chlorides in 1 ounce of water, add the rest of the acid and the arsenic solution, mix with the quinine solution, and make up.

With Tannin.—We have already remarked that tannin precipitates alkaloids. Here are good instances :—

I.			II.		
Quininæ sulph.	. . .	gr. ix.	Quinin. sulph.	. . .	ʒj.
Acid. sulph. dil.	. . .	ʒij.	Acid. sulph. dil.	. . .	ʒj.
Infus. rosæ	. . .	ad ʒviiij.	Tr. chlorof. co.	. . .	ʒij.
M.			Syr. limonis	. . .	ʒvj.
			Aq.	. . .	ad ʒvj.

In No. I. there is a very copious precipitate of quinine tannate, and in No. II., after a time, a faint scum is observed, which is due to the same cause. The tannin in No. I. comes from the rose-petals, in No. II. from the cinnamon of tr. card. co., which was part of tr. chlorof. co., B.P. 1885. Filtration in the first case is unjustifiable ; in the second the quantity of active material removed is so slight, and the gain in appearance so great, that filtration is advisable. A similar mixture with a little tincture of nux vomica and tr. card. co. ʒss. showed a considerable precipitate, but with a purchased tr. card. co. none, the explanation being that the latter tincture was made with cinnamon oil instead of bark.

With Salicylates quinine salts form a precipitate of salicylate of quinine. The following are good examples :—

Lithii salicylat.	. . . . .	ʒij.
Potass. iodid.	. . . . .	ʒss.
Ferri et quininæ cit.	. . . . .	ʒj.
Aq. chloroformi	. . . . .	ad ʒviiij.

In this case dissolve the citrate in an ounce of chloroform-water, and the salicylate and iodide in the rest contained in a measure or mortar, then add the citrate solution gradually to it, stirring assiduously in order to break up the precipitate thoroughly. Or place the three salts in a mortar, triturate with a little chloroform-water, then gradually add the remainder with continued trituration. The precipitate formed is diffusible though bulky.

Quininæ sulph.	. . . . .	gr. xx.
Sodii salicylat.	. . . . .	℥ss.
Acid. hydrobromici dil.	. . . . .	℥j.
Aquam		ad ℥viij.

The hydrobromic acid acts on the salicylate of sodium, precipitating salicylic acid. Salicylate of quinine is also formed if the quinine has been dissolved with the acid. The following is a good method of procedure: Dissolve 90 grains of the salicylate in 4 ounces of water in a mortar, and to this add the hydrobromic acid gradually, stirring constantly. Rub the quinine to fine powder, mix an ounce of water with it, dissolve the rest of the salicylate in 2 ounces of water, and add both to the mixture in the mortar.

Sodii salicylat.	. . . . .	℥j.
Tinct. quininæ		℥vj.
Aquam		ad ℥vj.

In this case also a precipitate of salicylate of quinine is formed which is not dissolved by the addition of acids. These examples might be indefinitely multiplied. The dispenser should remember that in most cases where salicylates in aqueous solution are to be mixed with quinine or cinchona preparations it is desirable that a little mucilage should intervene to prevent the precipitated quinine salicylate from aggregating and adhering to the bottle. With $1\frac{1}{2}$ grain of quinine sulphate per ounce of mixture no precipitate of salicylate is formed, with 2 grains there is a slight precipitate.

With Liquorice Extract.—This extract is well known as an excellent covering for the taste of quinine ; consequently

we occasionally find the two together in mixture, with far from good results. Thus:—

Ferri et quininæ citratis	℥iss.
Ammonii chloridi	℥ij.
Ext. glycyrrhizæ liq.	℥ss.
Aquam	ad ℥iv.

In this mixture a dense precipitate is formed which renders it most unsightly. So also in the following:—

Sodii sulphatis	℥j.
Quininæ sulph.	gr. xx.
Acid. sulphuric. dil.	℥ij.
Ext. glycyrrhizæ liq.	℥vj.
Aquam	ad ℥viij.

However dispensed a precipitate is unavoidable. Compounded as written a thick flaky precipitate is produced, which, when allowed to stand for a day, becomes tenacious and hardly diffusible. Omitting the acid, the precipitate is very fine and easily diffused through the liquid. The explanation is that liquorice extract is very readily decomposed by alkaloidal solutions, with separation of *glycyrrhizin*, the sweet principle of liquorice. There are several inorganic salts which precipitate the glycyrrhizin—as, for example, sodium sulphate and potassium acid tartrate. In the second prescription the acid also has an influence in inducing separation, less of it giving a better-looking mixture.

Tr. Quininæ Ammon. is a preparation in which the quinine exists as hydrate kept in solution by means of the excess of ammonia and by the rectified spirit, especially the latter. Consequently when it is mixed with much water, the alkaloid is precipitated, as in the following:—

Tr. quininæ ammoniatæ	℥x.
Ammon. bromid.	℥iss.
Syr. aurantii	℥ss.
Aq. camph.	ad ℥vj.

Science cannot prevent the precipitation without inducing chemical change. The addition of a few drachms of mucilage of acacia is advisable. Dissolve the ammonium bromide in

4 ounces of camphor-water ; add the syrup and 2 drachms of mucilage, pour in the tincture, shake gently, and make up.

A.
 Sodii salicylatis . . . ʒij.
 Potassii bicarbonatis . . ʒij.
 Tr. quininæ ammoniatæ . ʒj.
 Syrupi aurantii . . . ʒj.
 Aquam ad ʒvj.

B.
 Ammon. bromidi . . . ʒij.
 Tr. jaborandi . . . ʒij.
 Tr. quininæ ammon. . ʒvj.
 Aq. chloroformi . . . ad ʒvj.
 M.

There are two possible forms in which the quinine may be precipitated in A, hydrate and salicylate ; the precipitate is a mixture of both, and is peculiar in being green at first and gradually changing to brown. When B is dispensed in an unthinking way, a resinous-looking separation occurs and adheres to the sides of the bottle. Dissolve the bromide in the chloroform-water ; add the tincture of jaborandi, then pour in the ammoniated tincture gradually, stirring all the time. Dispensed in this way there is a slight precipitate in very small particles, which diffuse perfectly on shaking and do not adhere to the bottle.

C.
 Tr. quininæ ammoniatæ . ʒj.
 Liq. ammon. acetat. fort.
 (B.P. 1885) . . . ʒj.
 Aquam ad ʒviii.
 M.

D.
 Tr. nucis vom. . . ʒj.
 Sodii bromidi . . . ʒij.
 Spt. ammon. arom. . . ʒj.
 Quininæ sulphat. . . ʒj.
 Glycerin. . . . ʒj.
 Aq. chlorof. . . . ad ʒvj.

In the case of c mix the tincture and liquor, then add the water. A clear mixture results. The spt. ammon. arom. in D precipitates the quinine as hydrate, which will not diffuse without assistance. Place 10 grains of powdered tragacanth in a dry measure, pour on it the tincture of nux vomica and the aromatic spirit of ammonia, add about 4 ounces of chloroform-water, and stir ; in the mucilage thus formed dissolve the sodium bromide, add the glycerin, and make up with chloroform-water. Then place the quinine sulphate in a dry mortar and add to it the mixture gradually with steady trituration. In this way the precipitate is forcibly prevented from clotting as it is formed, and, although some of it rises to the surface of the mixture on standing, it readily diffuses by shaking.

SCALE PREPARATIONS IN MIXTURES.

Scale preparations are not difficult of solution, tartarated iron and sulphate of beberine being among the least soluble. Do not shake scale preparations with a solvent, as an abundant and persistent froth is in most cases formed. The following examples of mixtures containing scale preparations show the difficulties which may arise and how to deal with them :—

Ferri et quiniæ cit.	gr. xxxvj.
Spt. ammon. arom.	ʒiij.
Syr. zingiberis	ʒij.
Aquam	ad ʒvj.

Dissolve the ferri et quiniæ cit. in 2 ounces of water, and the other ingredients, with 2 drachms of acacia mucilage, in the remainder ; mix with gentle agitation.

Ferri et ammon. cit.	ʒj.
Acid. citric.	ʒj.
Tr. aurant.	ʒiij.
Syr. aurant.	ʒj.

The solution of the ferri et am. cit. is troublesome ; it should be dissolved in a test-tube, with a drachm of water, over a spirit-lamp. If the mixture is not wanted immediately, the ammonio-citrate will dissolve if added last to the other ingredients contained in the bottle, this being laid on its side ; with an occasional shake, in less than half an hour it will be dissolved. Ferri et quin. cit. is sometimes prescribed in this form, and the same procedure is to be adopted.

Ferri et ammonii citras varies considerably in solubility—that is to say, some specimens give perfectly bright solutions which show no deposit after standing for days, while others show a deposit in a few hours. This is due to the heat of scaling, and it is entirely avoided by using the solution of the compound unscaled, so that 4 fluid parts represents 1 part of the scaled compound. The scales also vary in reaction, sometimes being so acid as to give a solution which effervesces briskly with bicarbonates. In effervescing mixtures containing ammonio-citrate the acid should be put with the

scale compound. If citric acid is prescribed, it is advisable to heat the mixture containing it until the brown colour changes to green. This change occurs in a few days, and might alarm the patient, so that it is as well to carry it out before the mixture is dispensed. Tartaric acid does not act in this way. The varying reaction of ammonio-citrate of iron is well exemplified in the following :—

Ferri et ammon. citrat.	. . . . .	℥j.
Potassii chloratis	. . . . .	℥j.
Magnesiæ sulphatis	. . . . .	℥iiss.
Syrupi aurantii	. . . . .	℥iiss.
Aq. menthæ piperit.	. . . . .	ad ℥viiij.

Sometimes this has in it quite a copious precipitate of ferric hydroxide, which dissolves on the addition of a few grains of citric acid. With a markedly acid scale there is no precipitate.

Ferri et quiniæ cit.	. . . . .	℥j.
Potass. citrat.	. . . . .	℥iv.
Syr. aurant.	. . . . .	℥ss.
Aquam	. . . . .	ad ℥vj.

Even with perfectly neutral citrate of potash there is a considerable deposit of quinine citrate in this mixture. The addition of a few grains of citric acid produces a perfectly clear mixture, but even with that quinine citrate gradually crystallises out, adhering to the sides of the bottle. This phenomenon is now known to dispensers as 'salting out,' which is a convenient phrase for explaining that some salts neutralise the solvent action of ammonium citrate on quinine citrate, which *per se* is a feebly soluble salt (1 in 1,000). Perhaps the 'salting-out' process is not observed by the dispenser, as it takes some time, but prescribers should be advised to omit alkaline citrates from such mixtures.

I.	II.
Ferri et quiniæ citratis ℥ij.	Tr. digitalis ℥j.
Liq. ammonii acetatis ℥iiss.	Ferri et quiniæ citratis ℥ij.
Syr. aurantii ℥iij.	Acidi phosphorici diluti ℥j.
Aquam ad ℥vj.	Infusum quassiæ ad ℥vj.

The liq. ammon. acet. in I. should be distinctly acid, otherwise quinine hydrate will be precipitated. If II. is compounded in

the order of the ingredients—the citrate being dissolved in a little of the infusion—the tincture precipitates a little of the quinine as tannate, and the phosphoric acid throws out a portion of the iron as phosphate.

III.				IV.			
Ferri et quin. cit.	.	.	3j.	Quinin. sulph.	.	.	ʒij.
Ammon. carb.	.	.	ʒij.	Liq. strychninæ	.	.	℥80
Tr. aurant.	.	.	ʒij.	Ferri tartarat.	.	.	ʒij.
Aquam	.	.	ad ʒvj.	Spt. chloroformi	.	.	ʒij.
				Syr. limonis	.	.	ʒj.
				Aq.	.	.	ad ʒviiij.

No plan can be adopted for preventing precipitation of the quinine in III. The best results are obtained by dissolving the citrate in $\frac{1}{2}$ ounce of water, and mixing it with the tincture. Dissolve the ammonium carbonate in the rest of the water and mix the two solutions, pouring the citrate solution into the ammonia one. The addition of a little mucilage to the ammonia solution before mixing prevents the quinine adhering to the bottle. Compounded in different ways, IV. varies in colour each time, the precipitate varying in bulk according to the methods of compounding; it also varies in character, being fine, coarse, or curdy. The more bulky the precipitate the lighter in colour is the mixture when shaken up. The bulky precipitate, however, is not the finest. The finest is obtained in this way: Rub up the ferri tart. and quinine sulphate together, add the syrup of lemon gradually with trituration, then the solution of strychnine and the water, lastly the spirit of chloroform.

A.				B.			
Ferri tartarat.	.	.	3j.	Potassii citratis	.	.	gr. x.
Potassii brom.	.	.	ʒij.	Acidi citrici	.	.	gr. x.
Tinct. chlorof. co.	.	.	ʒivss.	Syrupi limonis	.	.	℥xv.
Syr. zingib.	.	.	ʒvj.	Tr. nucis vomicæ	.	.	℥v.
Aq. menthæ pip.	.	.	ad ʒvj.	Ferri tartarati	.	.	gr. x.
				Aquæ chloroformi	.	.	ʒss.

In the case of A, rub down the tartrate to powder in a mortar and stir with 3 ounces of the peppermint-water. By attempting to dissolve it along with the bromide an insoluble

coating is formed on its surface, and solution is very much retarded. Prescription B yields a precipitate of cream of tartar contaminated with iron.

BISMUTH MIXTURES.

Many and peculiar are the changes which occur in mixtures containing salts of bismuth. Bismuth subnitrate is the most frequently prescribed salt, being oftener used than all the other salts put together; then come bismuth carbonate and solution of bismuth in about equal proportions, and far behind them the salicylate and other special salts. It has already been observed (page 65) that bismuth subnitrate ($\text{BiONO}_3 \cdot \text{H}_2\text{O}$) parts with nitric acid when shaken or washed with water. On shaking bismuth subnitrate ʒij. with water ʒx. for a few seconds it will be found that the water has become quite acid. It is the acid thus liberated which is active in forming the clot in bismuth-and-tragacanth mixtures; and we find that if the subnitrate be washed with hot water in which a little sodium bicarbonate has been dissolved, it can be easily diffused through the liquid without forming a clot. Silicic acid in trace exists in bismuth salts and plays a part in clotting.¹ The following are examples of mixtures that clot:—

I.	II.
Bismuth. subnit. ʒij.	Bismuth. subnit. ʒiv.
Acid. hydrocyan. dil. ʒss.	Liq. morph. hydrochlor. ʒj.
Pulv. tragac. co. ʒj.	Tr. bellad. ʒiss.
Tr. chlorof. co. ʒss.	Pulv. tragac. co. ʒj.
Aquam ad ʒviiij.	Aq. chlorof. ad ʒviiij.

No. I. made a very curdy mixture, rendered worse by trituration in a mortar, and after several days became so thick that the bismuth would not subside. No. II. also rapidly clotted. There are three ways of obviating the difficulty: (1) By making the mixture of bismuth subnitrate and water feebly

¹ In recent years dispensers have had less trouble and more uniform results with bismuth salts, as manufacturers now turn them out very well washed and with less variation in density. It is also possible to buy them much lighter than formerly.

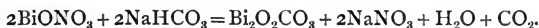
alkaline before adding the tragacanth, as by the addition of a few drops of ammonia solution or a grain or two of sodium bicarbonate; (2) by the substitution of bismuth subcarbonate for subnitrate; or (3) by the substitution of acacia for tragacanth in the pulv. tragac. co., which is the best alternative to adopt. This is well exemplified in the following:—

III.	IV.
Bismuth. subnit. ʒiij.	Bismuth. subnit. ʒiij.
Liq. strych. hydroch. ℥xij.	Liq. strych. hydroch. ℥xij.
Pulv. tragacanth. q.s.	Pulv. tragac. co. gr. xvij.
Aquam chlorof. ad ʒvj.	Pulv. acaciæ ʒiss.
M.	Aquam chlorof. ad ʒvj.

No. III. was first compounded with pulv. tragacanth. co. ʒj., and after standing a little the bismuth formed a jelly-like clot with the gum which would not diffuse throughout the mixture. Tragacanth mucilage behaved similarly. A few drops of ammonia solution prevents the gelatinisation, but is inadmissible in the presence of strychnine.¹ The prescription was therefore altered as shown in No. IV., and, dispensed *secundum artem* (bismuth and liquor in half the water, the powders with the rest, and the two mixed), clotting was obviated.

Fresh acacia mucilage does not give a clotted mixture. It must be added gradually to the bismuth salt already mixed with water or infusion. As to *adding mucilage to bismuth mixtures when not ordered*, see page 40.

Bismuth Subnitrate and a Bicarbonate react according to the following equation:—



The reaction is sometimes slow, but if it does not occur in dispensing the prescription, it is apt to take place after the mixture is sent out. Potassium bicarbonate acts more rapidly.

¹ With the above quantity of liq. strychninæ, there is, of course, no precipitate of strychnine in alkaline solution. The solubility of strychnine is 1 in 6,400 of water, but 10 minims of liquor per oz. can safely be dispensed without precipitation in a Sodium-bicarbonate mixture (see page 291).

Potassii bicarbonatis	3ij.
Bismuthi subnitratis	3ij.
Aquam destillatam	ad 3vj.

M.

On one occasion, probably on a summer day, this burst the bottle within half an hour; on another occasion, when the temperature was only 60° F., it was dispensed, the bottle securely corked, laid on its side, and agitated at intervals in expectation of an explosion. The result was disappointing, for after twenty-four hours had elapsed it was still intact, and the internal pressure was not sufficient to blow the cork out even when partly released. It was treated as it might be at a patient's house, for several days, agitating occasionally, and removing the cork, but the effervescence was not enough to cause inconvenience. In dispensing such prescriptions the possibility of an explosion must, however, be taken into consideration. Some dispensers substitute bismuth subcarbonate for subnitrate; others object on principle to 'substitution,' so mix the subnitrate and bicarbonate with boiling water to hasten the decomposition. The result is practically the same in both cases, for the finished mixture in either case contains bismuth subcarbonate, and that which has been made up with bismuth subcarbonate contains also the full amount of free alkaline bicarbonate. The dispenser should be guided by the following considerations:—When, as frequently happens, aromatic spirit of ammonia is also an ingredient in the prescription, subnitrate may be used, because the ammonium hydrate will either convert the subnitrate into bismuth hydroxide, or else will absorb any carbonic-acid gas that may be produced. When the amount ordered of each ingredient does not exceed 7 or 8 grains to the ounce in the case of sodium bicarbonate, and 5 grains in the case of potassium bicarbonate, there is practically no chance of explosion. If these quantities are largely exceeded, add the bicarbonate to most of the water, and shake until no more will dissolve; then add the subnitrate rubbed down with the remainder of the water, shake up, and loosen the cork occasionally. Then send out with the message, 'This bottle must

not be laid on its side; loosen the cork immediately it is received.' Lastly, when no aromatic spirit of ammonia is ordered, and the ingredients are present in large proportion (over 10 grains of each to the ounce), and the medicine has to be packed up at once, so that the cork cannot be loosened for a long time, it is wiser to complete the reaction by heating than to incur any risk of explosion.

Bismuth Salts and Iodides are sometimes prescribed together, with the result that patients and some dispensers become alarmed by the changes that occur in the appearance of the mixtures owing to the formation of bismuth oxyiodide—a brownish-red substance, which, happily, is a therapeutic agent, and may act quite as well as the ingredients from which it is formed. The following are examples of prescriptions in which the change occurs:—

I.	II.
Bismuth. subnit. ʒiiss.	Potassii iodid. gr. iij.
Pulv. trag. co. ʒiiss.	Tr. belladonnæ ʒxx.
Acid. hydrocyan. dil. . . . ʒiiss.	Mist. bismuthi sed. . . . ʒss.
Liq. morph. hydrochlor. . ʒiiss.	M. pro dose. Mitte ʒviiij.
Potass. iodid. gr. 54	
Aq. chlorof. ad ʒix.	

The formation of bismuth oxyiodide is slow, being hindered by the mucilage in I., and doubtless it is proportionate to the amount of bismuth subnitrate which gets into solution. *Mist. bismuthi sedativa* is a Guy's Hospital preparation (see IV.).

III.	IV.
Bismuth. salicyl. ʒiij.	Bismuthi subnitratis . . . gr. x.
Ext. opii liq. ʒiij.	Sodii bicarbonatis . . . gr. x.
Acid. hydrocy. dil. . . . ʒss.	Pulveris tragacanthæ com-
Potass. iodid. ʒij.	positæ gr. x.
Aq. chlorof. ad ʒviiij.	Liquoris morphinæ hydro-
	chloridi ʒxx.
	Aquam ad ʒj.

The powders in IV. are mixed together in a mortar and made into a thin cream with a little water, allowed to stand for two hours, and the morphine solution added. At this stage the

mixture is well stirred, and the potassium iodide (in a drachm of water) and tincture of belladonna added as soon as effervescence ceases. No. III. is a South African prescription of recent date, and a new combination. It makes quite a pretty mixture in this way: Make a mucilage with 12 grains of tragacanth and about 6 ounces of the chloroform-water and with this rub down the bismuth salicylate perfectly smooth; then add, in three or four portions, the potassium iodide dissolved in about 1 ounce of the chloroform-water, shaking well after each portion has been added; finally add the remaining ingredients, and make up. The bismuth oxyiodide, slowly formed, is very fine, and easily shaken up and uniformly distributed.

Bismuth Salicylate is one of a class of compounds (salol is another) which do not mix readily with water. They are best dealt with by placing in a dry mortar and triturating with sufficient undiluted mucilage of acacia to make a thin cream, then gradually stirring in the water. If any spirit is available, mix it with the bismuth salicylate.

I.				II.			
Potass. bromidi . . .	.	.	3ij.	Bismuthi salicylat. . .	.	.	3j.
Bismuth. salicylat. . .	.	.	3iss.	Liq. bismuthi . . .	.	.	3ij.
Pulv. acaciæ . . .	.	.	3iv.	Mucil. acaciæ . . .	.	.	3j.
Spt. chloroformi . . .	.	.	3lj.	Spt. chloroformi . . .	.	.	3j.
Aq. cinnamomi . . .	.	ad	3iij.	Aquam . . .	.	.	ad 3vj.

In No. I. rub the salicylate very fine in a mortar, making it into a smooth cream with the spirit of chloroform, thinning it with the water. Separately dissolve the bromide in half the water, and to this add fresh mucilage of acacia equivalent to the powder ordered; pour in the salicylate mixture, shake, and make up. Bismuth salicylate is soluble in ammonium-citrate solution, so that No. II. is a 'smooth' mixture.

Liquor Bismuthi.—The original of this preparation is a solution of bismuth citrate in a slightly alcoholic aqueous solution of ammonium citrate. The 1867 B.P. liquor contained ammonium nitrate and citrate, and was much stronger in bismuth than the original; a change was made in 1885, the

solution becoming one of ammonio-citrate of bismuth ; and in 1898 the manner of making the solution was altered, its composition remaining the same, substantially, there being no excess of ammonium citrate. Yet there is a difference, for the solution frequently turns quite milky, owing to separation of bismuth citrate, hence manufacturers are inclined to modify the preparation so as to make it permanently clear. These facts account for some of the differences which are reported in the appearance of bismuth mixtures.

Liq. bismuth.	. . . . .	℥ij.
Liq. magnes. carb.	. . . . .	℥iss.
Aq. chlorof.	. . . . .	ad ℥vj.

On compounding this prescription with the B.P. 1898 solution freshly prepared, the result was a mixture containing a copious white deposit of bismuth carbonate. This result cannot be avoided. With the 1867 liquor a clear mixture was obtained, because the excess of citrate of ammonium in it prevents the precipitation of bismuth citrate.

A.		B.
Liquor. bismuthi (Schacht)	℥ij.	Sodii bicarb. ℥iiss.
Tincturæ calumbæ . . .	℥j.	Spt. chloroformi . . . ℥iss.
Spt. ammon. aromat. . .	℥j.	Liq. bismuthi . . . ℥vj.
Potass. bicarbonatis . .	gr. x.	Aq. menth. pip. . . ℥viiij.
Aquam	ad ℥j.	M.
M.		

Bicarbonates do not affect Schacht's liquor, yet mixture *rapidly* becomes perfectly thick, although neither ammonium carbonate or hydrate nor potassium bicarbonate has this effect immediately. The following reaction appears to take place :—



This is followed by interaction between the dissolved bismuth citrate and the potassium carbonate, with precipitation of bismuth oxycarbonate. Even aromatic spirit of ammonia produces a precipitate in Schacht's solution in the course of a few days, and ammonium carbonate has a similar effect ; but ammonium carbonate and ammonia solution produce a faint

opalescence in Schacht's liquor in an hour or two. More ammonium citrate prevents this. Mixture B becomes milky at once, and the precipitation is most abundant with dispensing solution of bicarbonate because it contains carbonate.

I.		II.	
Liquor. bismuthi . . .	℥ij.	Mag. carb. pond. . .	℥j.
Sodii hyposulphit. . .	℥ij.	Liq. bismuthi . . .	℥ss.
Tr. nucis vom. . . .	℥j.	Liq. opii sed. . . .	℥iiss.
Inf. calumbæ	ad ℥vj.	Glyc. pepsin. . . .	℥ss.
M.		Aq. dest.	ad ℥ij.
		Sig. : ℥ss. ex aq. t.i.d. p. cib.	

No. I. is substantially bismuth hair-dye. On compounding it there is nothing abnormal-looking about it, but at the end of a day a yellowish-brown precipitate begins to fall, and this becomes darker on exposure. The precipitate is bismuth sulphide. No. II. mixture turns greenish in colour, owing to the presence of black bismuth sulphide, which doubtless arises from some sulphuretted compound in the glycerin of pepsin reacting with the bismuth precipitated. *The opium dose is excessive.*

Tinct. ferri perchlor.	℥iij.
Liq. bismuthi	℥iss.
Acid. phosph. conc. B.P.	℥j.
Tr. nucis vom.	℥iij.
Tr. quassie	℥iv.
Potass. bromid.	℥iv.

This can be made into a clear mixture by first mixing the tinct. ferri perchlor. with the phosphoric acid in a glass measure, then adding the two tinctures; afterwards gradually adding the liq. bismuthi, constantly stirring with a glass rod; and, lastly, adding the potassium bromide in fine powder.

SALTS IN MIXTURES.

The remarks on solution (pages 56-61) specially apply to mixtures of saline substances. The general directions there given as to the formation of solutions should be followed in making mixtures. Three methods of procedure are commonly

observed at dispensing-counters—(1) putting the salt to be dissolved into the bottle in which the mixture is to be dispensed and shaking with the solvent—this is the slovenly way, because it is always advisable to strain solutions into the bottle in which they are to be sent out ; (2) dissolving in a solution-bottle or measure by agitation ; and (3) in a mortar. This last is the poorest method, unless when hot water is the solvent, then a porcelain mortar may be used. Glass mortars or thick glass vessels should not be used for making solutions. When decoctions or infusions are ordered, the salt may be dissolved in them while hot, if the quantity of salt is not more than will remain dissolved in the cold solution. Carbonate of ammonium must be dissolved in the cold. Nearly all salts dissolve to a greater extent in warm than in cold water (compare page 59).

Many salts are more soluble if several are dissolved in the same vehicle, or if there is some acid present. Sulphate of potassium, for instance, is more soluble in a solution of sulphate of magnesium than in pure water. In such cases double salts are formed, which are more soluble than the separate constituents. In the case of 'Henry's Solution of Magnesia' the sulphuric acid makes the sulphate of magnesium dissolve in a smaller proportion of water than would otherwise be required.

The addition of tinctures, or other spirituous liquids, to a solution of a salt tends to throw the salt out of solution, because the mixture of spirit and water is not so good a solvent as water alone.

Liq. sodii arsenatis	m96
Spt. vini rect.	ad ʒiij.

In this case much of the arsenate crystallises out in a few hours. When the prescription was received, it was suggested to the doctor that the liquor should be mixed with $1\frac{1}{2}$ ounce of water and then $1\frac{1}{2}$ ounce of spirit added, as this solution yields no crystals. The alteration was sanctioned. Of course, there are many substances, but few inorganic salts, which are more soluble in alcohol than in water.

MIXTURES OF INSOLUBLE SUBSTANCES.

Powders which are insoluble in aqueous menstrua and which do not readily diffuse in water should be rubbed down in a mortar with some of the fluid, for if put into the bottle and shaken with the fluid, many powders of that kind float about in little balls, which are afterwards difficult to diffuse. Especially is this the case with vegetable powders, carbonate of magnesium, light calcined magnesia, calomel, and precipitated sulphur. Ipecacuanha and some other vegetable powders form a doughy mass if put into a bottle and water poured upon them.

The best plan is to triturate such powders in a mortar with syrup or glycerin, if ordered, or else with just enough water to make a thin cream (neither more nor less), and rub together until quite uniform before further dilution, *e.g.* :—

Tr. calumbæ	3vj.
Ammon. carb.	gr. 50 .
Pulv. rhei	gr. 50
Sodii bicarb.	3ij.
Syrup. zingib.	3j.
Aquam	ad 3vij.

The rhubarb and soda may with skill be diffused by the shaking-up method, but more froth is produced than the tincture will dissipate. It is preferable to begin with a mortar, powder the ammonium carbonate, add the rhubarb and soda, triturate with the syrup, dilute with water, add the tincture, and fill up.

A universal rule which no dispenser should neglect is : *All potent substances which are slow of solution, such as perchloride of mercury, strychnine, and the like, should be completely dissolved before they are placed in the bottle.*

EXTRACTS IN MIXTURES.

Solid extracts are seldom prescribed in mixture in this country, but they are on the Continent, and the following hints by the late Dr. Hager will be useful to the English dispenser.

When alcoholic extracts have to be dissolved in a mixture,

the vehicle in which they are rubbed down into solution should not be hot.

If purely resinous extracts have to be compounded in a mixture, they should first be rubbed in a mortar with twice or three times their weight of powdered gum arabic, then combined with the vehicle perfectly cold. If any syrup is ordered in the mixture, the resinous extract should be rubbed down with it. Example :—

Ammonii muriatici	5'0
Succi liquiritiæ	5'0
Aquæ destillatæ	100'0
Ext. cinæ æth.	1'5

M. et solve.

The extract should be first rubbed with powdered gum arabic 1'5, and with the chloride of ammonium, then with the liquorice extract in concentrated solution, and, lastly, with the cold water.

Extracts made with water and alcohol are difficult to mix with a purely spirituous solution. Example :—

Extracti hyoscyami, Ph.G.	1'0
Tincturæ valerianæ	5'0
Spiriti ætherei	20'0

Misce.

In this prescription, the spirit of ether being only an adjuvant, a slight modification must be made. The extract must be dissolved in 2 parts of distilled water, then the tincture of valerian and 18 (instead of 20) parts of spirit of ether added. In the case where the fluid with which the extract is to be mixed is itself a strong medicine (tinct. digitalis æth., for example) nothing remains but to rub it with its own weight of water, and then rub the quasi-solution vigorously with the tincture.

Inspissated Juices are similarly treated; but, when dissolved in water, they should stand in a measure for two or three minutes to settle, and the fluid should then be poured off carefully from the sediment.

The narcotic non-resinous extracts can be kept in concentrated solutions. Ten parts of extract should be dissolved in

a mixture of 12 parts of water, 4 parts of glycerin, and 4 parts of rectified spirit. When dispensing from these solutions, three times the quantity of extract ordered must be weighed. The label should indicate this exactly. Some extracts, such as aconite, henbane, and belladonna, kept in solution, require to be well shaken before the solutions are weighed. [In Germany liquids are weighed.]

Lactucarium ought to be rubbed down in a mortar with twice its weight of sugar and a few drops of spirit of wine.

Liquorice Extract.—‘Solazzi’ can be kept in solution in its own weight of distilled water, or in a mixture of 3 parts of distilled water and 1 part of glycerin, in 8-oz. bottles quite full, but ext. glycyrrh. liq. is the only preparation to use in prescriptions. Some acids and many salts of alkaloids can only be mixed with solution of liquorice in a very diluted condition, as they precipitate the glycyrrhizin. This is due in some measure to ‘salting-out’ of glycyrrhizin, but liquorice extract is acid, and the ammoniated preparation gives clear mixtures in many cases.

A.	B.
Calcii chlorid. . . . gr. x.	Quinin. sulph. . . . ʒss.
Ext. glycyrrh. liq. . . ʒiss.	Acid. hydrobrom. dil. . ʒij.
Aquam ad ʒiss.	Liq. arsen. hydrochlor. . mix.
Ft. mist.	Aromat. cascara . . ʒiss.
	Aq. menth. pip. . . ad ʒvj.

The brownish precipitate in A is cleared up by the addition of a few drops of ammonia solution. There is liquorice in aromatic cascara, but the ammonia expedient cannot be adopted for B, which has a heavy precipitate of glycyrrhizin. The addition can be made to neutral mixtures with advantage.

MISCELLANEOUS INGREDIENTS.

General rules break down now and then, so that the dispenser should have some acquaintance with the behaviour of certain substances which must be treated according to their

characteristics. The chapter on Special Drugs gives useful information for general guidance, and in the paragraphs which here follow various peculiarities are illustrated by actual prescriptions.

Acetanilidum.—The sparing solubility of this drug in water may tempt the dispenser, as in the following instance, to treat it as an insoluble substance when prescribed in mixture :—

Quinin. mur.	.	.	.	.	.	gr. xvj.
Antifebrin.	.	.	.	.	.	ʒss.
Glycerini	.	.	.	.	.	ʒj.
Pulv. gum. acaciæ	.	.	.	.	.	ʒj.
Aq.	.	.	.	.	.	ad ʒviij.

Ft. mist.

The prescriber appears to have considered the antifebrin insoluble, and therefore ordered the gum to suspend it, but the glycerin suffices to dissolve and keep it in solution. Dissolve the acetanilide and quinine hydrochloride in 1 ounce of boiling water ; add the glycerin and nearly all the rest of the water, then an equivalent of acacia mucilage, and make up.

Acidum Benzoicum.—This is readily soluble in alcohol of various dilutions and in glycerin. If, therefore, any tincture is prescribed along with it, the acid should be dissolved in the tincture and the water added. If the acid is in excess of the alcohol solubility power, it must be suspended, but it is absolutely requisite to rub it down to fine powder first, owing to its light feathery nature, which would prevent it diffusing, as in this example :—

Acidi hydrobromici diluti	.	.	.	.	ʒss.
Aceti ipecacuanhæ	.	.	.	.	ʒss.
Nepenth.	.	.	.	.	℥XL.
Acidi benzoici	.	.	.	.	gr. XL.
Syrup. croci	.	.	.	.	ad ʒij.

Acidum Carbolicum.—Rarely prescribed in mixtures for internal use, but when it is, the acid should be sent out in complete solution, as undissolved acid acts as a caustic. The use of hot water ensures safety and rapidity.

Acidum Gallicum.—Cold water dissolves about 1 per cent. ; hot water, one-third of its weight. It is usually prescribed in excess of its solubility in cold water. It should be rubbed down to fine powder, which is distributed by shaking.

Acidum Hydrocyanicum.—Dispensers should never think of dispensing any other preparation than the pharmacopœial one, unless Scheele's acid is specially ordered. Owing to the extreme volatility of the acid, it should be the last ingredient added, the mixture being made up and sufficient space left in the bottle for the acid, which is best measured with a graduated syringe. Mixtures containing hydrocyanic acid should be labelled 'Shake the bottle.'

Acidum Salicylicum.—Considering that this acid is really ortho-hydroxybenzoic acid, $C_6H_4(OH).COOH$, benzoic acid being $C_6H_5.COOH$, it is not surprising that the two closely resemble each other in physical characters, especially in solubility. On pages 71 and 72 the properties of salicylic acid are given, and the question of what kind to use in dispensing is discussed. Mention is there made of the solubility of the acid in alkaline acetates. This is sometimes taken advantage of, as in the following :—

Liquoris ammonii acetatis	℥ij.
Acidi salicylici	℥ij.
Tincturæ quiniæ	℥iss.
Syrupi aurantii	℥ss.
Aquæ	℥ij.

There is not sufficient ammonium acetate in this to dissolve the salicylic acid (a drachm of the solution being required for 5 grains of the acid), so that the mixture contains undissolved acid from the first, and at the end of twelve hours quinine salicylate separates. It is therefore advisable to treat the acid as an insoluble substance from the first by rubbing it to fine powder in a mortar, with some of the syrup and water, adding $\frac{1}{2}$ ounce of acacia mucilage, then the liquor ammon. acet., tincture, and syrup, and making up to 6 ounces with water.

The mixture contains free acetic acid. For each drachm (60 grains) of salicylic acid there are required, of

Ammonium-acetate solution	10 dr.
Borax	75 gr.
Potassium acetate	50 gr.
Potassium citrate	120 gr.

A similar change to the combination of quinine and salicylates occurs in the following :—

Sodii salicylat.	3iij.
Tinct. buchu	3vj.
Decoct. cinchon.	ad 3viiij.

Salicylate mixtures are very apt to change colour owing to oxidation (compare page 243 and page 299). The following is an example of a different change :—

Sodii salicylat.	3ij.
Ferri sulph.	℥j.
Pulv. tragac. co.	3j.
Syrup. aurantii	3ss.
Aquam chloroformi	ad 3vj.

This produces a deep reddish mixture, due to the formation of salicylate of iron. Salicylates are about the most delicate test for ferric salts, and, as it is impossible to preserve ferrous sulphate absolutely from oxidation, it naturally follows that the mixture should be dark-coloured, whether it is prepared from salicylate made with natural or artificial acid. The sulphate of iron should be dissolved in the syrup and 1 ounce of chloroform-water; the salicylate and compound powder made into a mixture with the rest of the water, and the iron solution then added to it. In this way the most lightly coloured mixture is obtained.

The combinations of salicylic acid, such as aspirin (acetyl-salicylic acid) and diuretin (sodio-theobromine salicylate), behave in many instances like the acid itself, and difficulties with them should as a rule be considered as salicylic difficulties. See the index for references to some of them.

Alkaloids.—A knowledge of the ordinary alkaloidal reactions is very useful at the dispensing-counter. The following are fair examples of the cases in which this knowledge may be turned to practical account :—

A.	B.
Liq. morphin. hydrochlor. ℥iv.	Liq. Donovan. . . ℥ij.
Sodii bicarb. . . ℥ij.	Liq. strychninæ . . ℥j.
Spt. chloroformi . . ℥ij.	Syr. ferri iodidi . . ℥j.
Inf. gent. co. . . ad ℥viij.	Glycerinum . . ad ℥ij.

There is no precipitate in A if sodium bicarbonate is used and not old dispensing solution, but in any case a trifling amount (compare page 42). On the addition of liq. strychninæ to B, the mixture assumes a yellow colour. Strychnine and other alkaloids are precipitated by alkaline iodides, and especially by mercuric iodide (a solution of which in potassium iodide and water is known as Meyer's alkaloidal reagent). The precipitate in this case is an iodo-hydrargyrate of strychnine, resulting from interaction between the strychnine hydrochloride and the arsenium and mercuric iodide of the Donovan's solution. Such precipitates are heavy, and in consequence dangerous, as the last dose in a bottle may contain nearly all the toxic alkaloid originally put into the mixture.

Ammonium Benzoate.—The commercial salt is sometimes unduly acid and difficultly soluble ; if so, it should be neutralised with a little ammonia. It is soluble in 6 parts of water.

Ammonium Bromide and sodium nitrite in aqueous solution interact when warmed, and the ammonium nitrite formed splits up into nitrogen and water. The interaction does not occur with potassium or sodium bromide, either of which should replace ammonium bromide in such mixtures. (*C. & D.*, 1914, I. 552.)

Ammonium Carbonate should always be dissolved in the cold, never with hot water. Only translucent pieces should be used at the dispensing-counter, never the effloresced salt or pulv. ammon. carb., which are deficient. It keeps fairly

well in solution, and in dispensaries where a supply can be used up within three days a 1-in-8 solution may be stocked.

Borax.—The peculiarities of borax are discussed later, in the chapter on Applications (page 343). It is most used externally. The following prescription is of interest in this section as being for a mixture and having created a lively correspondence in *The Chemist and Druggist*, August to October, 1898 :—

Sodii bromidi	3iiss.
Sodii biboratis	3iij.
Mucilaginis acaciæ	3ij.
Aquæ chloroformi	3j.
Extracti ergotæ liquidi	3iss.
Aquam	ad 3viij.

According to the British Pharmacopœia the aqueous solution of gum acacia 'forms with solution of borax a more or less translucent white jelly.' A pharmacist who dispensed the above prescription obtained a jelly, but on communicating with the prescriber, a sample of a limpid mixture was sent. On publication of the prescription in *The Chemist and Druggist*, a number of correspondents sent in mixtures which were more or less limpid, these being obtained by diluting the mucilage to the fullest possible extent before adding a solution of the borax and sodium bromide in warm water. Mr. W. Martindale sent us a pourable mixture made in this way ; but the original correspondent, following his directions, could only get a jelly with fresh mucilage, a pourable mixture with mucilage from the same gum not quite fresh, and a limpid mixture with cheap gum. Our own experience is that if made from a gum acacia strictly answering the Pharmacopœia tests, the mixture cannot be made limpid, but with old and acid mucilage of any gum a limpid mixture results. It will be observed that borax is in excess of the solubility-point, and some of it crystallises out.

Butyl-chloral Hydras.—A few general precautions in respect to dispensing butyl-chloral hydrate in solution have already been noted (page 65). The chief difficulty with this substance is its tendency to form water-insoluble oily-like

compounds especially with alcohol, as exemplified in the following prescriptions :—

I.	II.
Croton-chloral. hydrat. ℥ij.	Butyl-chloral. hydrat. ℥ij.
Spt. vini ʒss.	Glycerini ʒij.
Quininæ sulphat. ʒss.	Tr. gelsemii ʒij.
Aq. ad ʒx.	Aq. chloroform. ad ʒvj.
Fiat mistura.	Fiat mistura.

The writer of No. I. prescription directed that the butyl-chloral hydrate and the quinine sulphate should be rubbed together, the spirit added to dissolve, then the water. The spirit simply makes the alkaloid and chloral an oily mass, which apparently is not at all affected by water. Apart from the effect which alkaloids have on butyl-chloral hydrate (of which examples follow) alcohol converts it into butyl-chloral alcoholate, a compound which is practically insoluble in water. Dispensing-solutions of the hydrate are sometimes made with a mixture of rectified spirit and glycerin, which on keeping for a few days are quite immiscible with water, and on pouring a little of such solutions into water butyl-chloral alcoholate sinks to the bottom in oily drops. Alcohol as a solvent for the hydrate should be avoided. The British Pharmacopœia states that the hydrate 'is soluble in about 50 parts of water, and in its own weight of glycerin or of alcohol': it would be advisable for the B.P. to add that in alcoholic solution it is changed to an insoluble substance. The best dispensing-solution is made by dissolving 1 ounce of the hydrate in $2\frac{1}{2}$ fluid ounces of glycerin and 1 ounce of boiling water, and when cold making 4 fluid ounces of the solution with water. In making aqueous solutions care should be taken not to heat above 170° F., otherwise the hydrate fuses and an opalescent mixture results. No. II. prescription typifies the best method of compounding. Heat the glycerin in a test-tube by dipping the tube in a small basin of boiling water for a few minutes, add the butyl-chloral hydrate, and dissolve. Half fill a 6-ounce bottle with chloroform-water, pour the glycerin solution into it and shake, wash the test-tube with 1 ounce of chloroform-water and add to the bottle, add the tincture, and make up. Reference has been

made to the influence of alkaloids upon the hydrate. The following are good examples :—

III.		IV.	
Butyl-chloral. hyd.	3iss.	Quin. hydroch.	gr. 36
Ferri et quin. cit.	℥iv.	Croton-chloral. hyd.	3j.
Tr. gelsemii	3ij.	Antipyrin.	gr. 36
Aq.	ad 3viij.	Ammon. brom.	3j.
M.		Syr. aurant.	3ss.
		Aq. chlorof.	ad 3ij.

No. III. dispensed as written (the butyl-chloral hydrate solution being added to the citrate solution) gave a thick, sticky precipitate. A clear mixture was obtained by first dissolving the hydrate in $\frac{1}{2}$ ounce of glycerin and half as much water gently heated, adding the solution to the rest of the ingredients previously mixed and dissolved. An oily deposit forms in No. IV. when either the antipyrin or butyl-chloral hydrate is added to the rest of the ingredients in the prescription. These two ingredients are incompatible (as chloral hydrate and antipyrin are, page 97), and some addition or omission is necessary to make a clear mixture. The following modification does this :—
 (a) Dissolve the quinine in 2 ounces of water acidulated with 40 drops of dilute hydrochloric acid ; (b) dissolve the antipyrin and bromide in the same quantity of water ; (c) dissolve the butyl-chloral hydrate in a mixture of spt. chlorof. 3j. and S.V.R. 3j. (or spt. chlorof. 3ij.) and make up to 2 ounces with water. Mix *a*, *b*, and *c* ; an oily deposition of butyl-chloral antipyrin immediately takes place, which, after a few hours, with an occasional shake dissolves, forming a clear mixture.

Caffeinæ Citras sometimes gives trouble owing to its loose combination, water sufficing to split it up, partly or wholly, into caffeine and citric acid, both of which dissolve as such. The following show what may happen :—

I.		II.	
Caffeinæ citrat.	3ij.	Sodii salicyl.	3iss.
Sodii salicylat.	3ij.	Caffein. cit.	gr. xx.
Aq.	ad 3xij.	Phenazoni	3j.
M.		Syr. aurantii	3iij.
		Aq.	ad 3viij.

No. I. dispensed as written becomes, after a brisk shake, solid in two minutes. If solutions of the citrate and salicylate are mixed without shaking and left undisturbed, the growth of crystallisation may be observed proceeding with great beauty. This is due to the free citric acid combining with the alkali of the sodium salicylate, thus setting salicylic acid free. Sodio-caffeine salicylate is the most soluble compound of caffeine, and is formed by dissolving caffeine in sodium-salicylate solution; advantage should, therefore, be taken of this fact by dispensing No. I. with an equivalent of caffeine in place of the citrate—that is, half the amount. It is worthy of note that double the quantity of sodium salicylate gives a clear mixture with the caffeine citrate, and this is also obtained by the use of a drachm of sodium citrate, so that in gouty or rheumatic cases, where the citric acid is advantageous, therefore required, either of these expedients may be resorted to. No. II. mixture crystallises after standing a short time, although sodium salicylate is present in greater proportion than that necessary for perfect solution. By mixing the ingredients in the order written, considerable precipitation of crystals takes place a few seconds after the phenazone is added. When the mixture is warmed, the crystals dissolve, but separate again after several hours. When the order of mixing is changed—as, for example, (1) sodium salicylate, caffeine citrate, phenazone; (2) caffeine citrate, phenazone, sodium salicylate; (3) phenazone, sodium salicylate, caffeine citrate—different results are obtained. No. 1 immediately gives crystals, Nos. 2 and 3 remain clear for many hours, but the crystals formed are not like those in No. 1, which are phenazone-like, but are nearly $\frac{1}{2}$ inch long. All the crystals are soluble in a small quantity of water, and give with ferric chloride the characteristic colour given by that salt when added to a mixture of phenazone and a salicylate. In order to compound the mixture clear, the caffeine citrate should be neutralised with ammonia. A mixture thus made remains clear, but the use of half the amount of caffeine has the same effect. This is further illustrated in the next two prescriptions, where the inorganic salts have some influence on precipitation in B :—

A (clear).				B (precipitate).			
Caffeinæ	.	.	gr. x.	Caffeinæ citratis	.	.	gr. v.
Antipyrini	.	.	gr. xv.	Phenazoni	.	.	gr. vij.
Sodii salicylat.	.	.	ʒss.	Sodii salicylat.	.	.	gr. vij.
Aquam	.	.	ad ʒj.	Potass. bromid.,			
				Ammon. bromid.	.	aa.	gr. x.
				Aq.	.	.	ad ʒj.

In the case of the next prescription, if the first two ingredients are put into a bottle and the infusion added, a thick precipitate is formed. A clear solution is obtained by dissolving the potassium citrate in half the infusion and the caffeine citrate in the other half, and adding the latter to the former. If the order of mixing is reversed, precipitation takes place.

Potassii citratis	.	.	.	.	ʒiij.
Caffein. citratis	.	.	.	.	ʒij.
Inf. scoparii	.	.	.	.	ad ʒiv.

Caffeine *per se* is more soluble in water (1 in 80, compare page 42) than alkaloids generally are, consequently there is less fear of it being precipitated from its salts by alkalies, as the following shows :—

Sodii bromidi	.	.	.	.	ʒiv.
Caffeinæ hydrobromidi	.	.	.	.	ʒj.
Spiritus ammoniæ aromatici	.	.	.	.	ʒss.
Aquam	.	.	.	.	ad ʒviiij.

Here the proportion of caffeine to solvent is about 1 to 200, or much in excess of the proportion for complete solution.

Calcii Phosphas.—It is well to remember that fresh precipitates are more soluble in appropriate solvents than the same precipitates when dried. This fact was taken advantage of by a dispenser in compounding the following prescription :—

Calcii phosphatis	.	.	.	.	ʒiij.
Acidi citrici	.	.	.	.	q.s. ad solutionem
Syrupi aurantii	.	.	.	.	ʒj.
Aquam destillatam	.	.	.	.	ad ʒvj.

Take one teaspoonful three times daily.

Six drachms of citric acid did not completely dissolve stock phosphate, but freshly precipitated phosphate dissolved in half an ounce of acid.

Chloral Hydras behaves towards alcohol like butyl-chloral hydrate, and is decomposed by alkalies with liberation of chloroform, as in the following mixture :—

Chloralis hydratis	3j.
Ammonii carbonatis	3j.
Tincturæ digitalis	3j.
Aquam	ad 3vj.

This is a bronchitis-mixture which in two days becomes quite strong in chloroform, and then seems to be more active. Substances with which chloral hydrate liquefies (see page 97) do not as a rule make good aqueous mixtures with it ; thus :—

Sodii bromidi	3iv.
Phenazoni	3iss.
Chloralis hydratis	3iss.
Syrupi limonis	3j.
Aquam	ad 3iv.

In this monochloral-antipyrin is formed and is deposited as oily drops, resembling butyl-chloral alcoholate in behaviour. This is probably a case of salting-out, but if chloral hydrate 1, and phenazone 1, be separately dissolved each in water 6, and mixed, the solution is clear. Combination of the two seems to be promoted when they are dissolved together. Many cases of liquefaction and precipitation are due to the substitution of one molecule for another in a compound, and the more complex the molecule substituted the more insoluble is the product. Chloral hydrate is one of the agents that make antipyrin solutions green. See page 295.

Creosotum.—The utility of creosote and its active principle, guaiacol, in the treatment of consumption has revived the prescribing of this old remedy. In doses of a minim or two creosote presents little difficulty in compounding in liquid form, as an ounce of water dissolves about 2 minims of it. *Mistura creosoti*, B.P., is a good example of such a mixture, the formula being :—

Creosote	16 mins.
Spirit of juniper	16 mins.
Syrup	1 fl. oz.
Distilled water	to 16 fl. oz.

Dissolve the creosote by shaking with 14 ounces of the water, add the spirit and the syrup, and make up with water.

Weak mixtures like this are given for gastric troubles, such as flatulence and hiccough. In the larger doses required in phthisis, 5 minims being frequently given, it is best administered in capsules, the creosote being mixed with its own volume of olive oil. Similar mixtures of oil and creosote are sometimes prescribed as emulsions with gum acacia to be compounded in the usual manner. Acacia mucilage alone suffices to suspend the creosote, as in the following instance :—

Creosoti	℥ 160
Tincturæ gentianæ comp.	℥ 160
Spiritus vini rectificat.	℥ 160
Extracti glycyrrhizæ liq.	ʒss.
Aquam	ad ʒviiij.

The prescriber wished this to be dispensed with acacia mucilage, but a much better mixture is obtained by mixing the liquid extract and the same quantity of mucilage with 3 ounces of water in a bottle, and adding, all at once, a mixture of the (1) creosote, (2) S.V.R., and (3) tincture, shaking gently, and making up. It is frequently prescribed with cod-liver oil, but does not give a clear solution in this case. A mixture of equal volumes of creosote, absolute alcohol, and castor oil dissolves in cod-liver oil in any proportion. The cloudiness produced by mixing lime-water and spirit is cleared by creosote.

Ether.—In regard to mixing with water, see the paragraph on volatile ingredients (page 306). It is worth bearing in mind respecting ether that it generally liberates iodine from potassium-iodide solutions, owing to the fact that on exposure to sunlight ether develops a trace of ozone, which reacts with the potassium iodide. Mixtures containing iodide and ether should therefore be made alkaline with potassium bicarbonate.

Extractum Ergotæ Liquidum.—Reference has already been made to the fact that this preparation is apt, on dilution with aqueous fluids, to undergo the viscous fermentation (see page 248). This experience is based upon the old preparation made by exhausting the drug with water, evaporating to three-quarters of the drug bulk, and adding alcohol to preserve. Any preparation made *in vacuo* which is not sterile before evaporation, and is not sterilised by boiling before the preservative is

added, contains micro-organisms and their spores. The preservative may destroy the micro-organisms, but it seldom affects spores, so that when suitable conditions arise, the spores revivify, and fermentation of mixtures may result. *Liquid extracts* generally are prone to yield somewhat copious precipitates on dilution with water, especially in presence of acids ;
e.g. :—

Extracti yerbæ santæ liq.	. . . . .	ʒj.
Syrupi scillæ	. . . . .	ʒj.
Spiritus chloroformi	. . . . .	ʒij.
Acidi hydrobromici diluti	. . . . .	ʒiij.
Aquam	. . . . .	ad ʒj.

A heavy precipitate forms. Pharmaceutical ethics does not permit dispensers to make such mixtures elegant by filtration, which is to be regretted, for rarely are such precipitates of the slightest therapeutic value. Of course, when the precipitates are resinous, it would be wrong to remove them by filtration, but not so when inert extractive matter is the cause of turbidity.

Ferri Sulphas.—Solutions of ferrous salts, if neutral, soon lose their brightness through oxidation of the salt, some ferric hydroxide giving a rusty appearance to the solution. This appearance is prevented by acidifying the solution ; thus in the case of ferrous sulphate, dilute sulphuric acid is used, and the fact appeared to be known to the writer of the following prescription, who, however, was ‘no chemist’ :—

Ferri sulphatis	. . . . .	gr. xv.
Acidi sulphurici diluti	. . . . .	℥XL.
Ætheris chlorici	. . . . .	ʒiss.
Spiritus ammoniæ aromatici	. . . . .	ʒij.
Aquam	. . . . .	ad ʒviiij.

Here the aromatic spirit of ammonia neutralises the free acid and precipitates some green ferrous carbonate. Yet the mixture was dispensed clear by two chemists, who probably added sufficient acid to dissolve the ferrous carbonate, which, in the circumstances, is the wisest thing on the whole, considering that the therapeutic properties of the aromatic spirit are extinguished in the combination.

Infusum Rosæ Acidum.—Every student of volumetric analysis knows that in titrating acids or alkalies certain vegetable colours are used as indicators, because they show different colours in acid, alkaline, and neutral solutions. The colour of rose-petals is not so used, but it might be : it is a beautiful red in presence of acids, and a vivid green when alkali is in excess. This should be kept in mind when compounding the acid infusion of roses, and prescribers should be warned not to prescribe alkalies with it, as in the following instance :—

Magnesii carbonatis	ʒj.
Magnesii sulphatis	ʒiss.
Glycerini	ʒss.
Infusum rosæ acidum	ad ʒviij.

M.

As soon as the magnesium carbonate is added, the sulphuric acid of the infusion begins to be neutralised, the mixture becomes blue, and eventually brown.

Infusum Serpentariæ.—For some reason or other doctors are fond of the following prescription :—

Tincturæ iodi	ʒij.
Infusi serpentariæ	ʒviij.

M.

It gives dispensers a great deal of trouble, because the mixture may be in colour like black ink, or like pale sherry, or like rich brown sherry. The inky-coloured mixtures are of course due to the infusion containing starch taken into solution from the bruised root (see page 55). Sometimes the drug contains no starch at all, but in any case it is advisable to make the fresh infusion from unbruised root, and with water at 160° F., infusing three times longer than the Pharmacopœia directs. Many dispensers prefer to use the concentrated preparation (liq. serpentariæ conc., B.P. 1898), which is free from starch, and gives a sherry-coloured mixture with iodine.

Liquor Hydrargyri Perchloridi.—Remarks have already been made regarding the readiness with which mercuric chloride combines with alkaloids. See next page.

I.		II.	
Liq. hydrarg. perchlor.	℥j.	Liq. hydrarg. perchlor.	℥ij.
Liq. Donovanii	℥j.	Sodii salicylatis	℥ij.
Aquæ destillatæ	℥j.	Sodii bicarbonatis	℥ij.
M.		Spt. chlorof.	℥iss.
		Syr. aurantii	℥iv.
		Aq.	ad ℥viiij.

A precipitate of mercuric iodide is formed in No. I., and of mercuric oxide in No. II.

Liquor Pepticus.—A correspondent asked us if the following mixture should be dispensed with or without a sediment :—

Liq. peptici (Benger's)	℥iiij.
Sodii bicarb.	℥iv.
Glycerini	℥vj.
Inf. quassiae	ad ℥viiij.

To this the late Mr. Benger replied : 'I find the prescription yields a clear mixture, which, after standing several days, shows no sign of sediment. *Liquor Pepticus* (Benger) is slightly acid, and will cause effervescence when mixed with *Sodæ bicarb.* It is difficult to see the object of the prescriber in this case, as pepsin and its preparations are practically inert in any but acid media. This mixture is strongly alkaline, and the pepsin would certainly have to wait its turn, till after the soda had been neutralised by the acid contents of the stomach.'

Liquor Sodii Arsenatis.—The following mixture yielded in a few minutes after compounding a granular precipitate of strychnine hydrate :—

Liquoris sodii arsenatis	℥ss.
Liquoris strychninæ	℥ss.

On testing the liq. sodii arsenat. it was found to be alkaline in reaction, and this has been proved to be the normal condition of the solution. Various suggestions have been put forward to account for this (see *The Chemist and Druggist*, 1899, 11.

1030), but it suffices for the dispenser to know that the solution is alkaline, and that it should be slightly acidified (in this case with dilute hydrochloric acid) before mixing with anything which free alkali may decompose to form a precipitate.

Liquor Strychninæ Hydrochloridi.—The feeble solubility of strychnine hydrate has been pointed out (pp. 41–2) as a source of danger when solution of strychnine is prescribed in alkaline mixtures. The following are prescriptions in which the strychnine is thrown out of solution:—

I.		II.	
Liq. strych. hydrochlor.	. ʒiij.	Liq. strychninæ	. . ʒj.
Elixir saccharin.	. ad ʒij.	Sodii bicarbonat.	. . ʒij.
M.		Liq. bismuthi	. . ʒj.
[Here the sodium bicarbonate of		Spt. chloroform.	. . ʒij.
the elixir throws out the strychnine.]		Aq. . . .	. ad ʒviiij.

NOTE.—Finne more and Williamson found that in 1-oz. aqueous mixtures 10 minims of liq. strych. and 15 grains of sodii bicarb. remained clear for thirty days; 20 grains of potass. bicarb. and 20 minims of liquor crystallised in twenty days; 5 grains of ammon. carb. and 5 minims of liquor crystallised in ten days; 10 minims each of liq. ammon. and liq. strych. crystallised in one day; and 30 minims of spt. ammon. arom. and 8 minims of liq. strych. crystallised in seven days. Tincture and liquid extract of nux vomica of proportionate strychnine strength are more stable. ('Year-book of Pharmacy,' 1914.) Compare with p. 42.

The B.P. 1885 solution of strychnine was more acid than the 1914 one, and sometimes deposited on keeping. The 1914 solution also behaves differently with mercuric chloride:—

Hydrargyri perchloridi	. . . . . gr. j.
Liq. strychninæ	. . . . . ʒj.
Aquam	. . . . . ad ʒij.

This remains clear for several days if compounded with the 1914 solution, but with the 1885 one it gives almost immediately a crystalline precipitate.

III.		IV.	
Potassii iodidi	. . . ʒiss.	Hydrarg. perchlor.	. . gr. ij.
Liq. strychninæ	. . . ʒiss.	Potassii iodidi	. . ʒiv.
Aq. menth. pip.	. . ad ʒij.	Liq. strychninæ	. . ʒij.
M.		Glycerini	. . ʒiss.
		Inf. quassia	. . ad ʒviiij.

No. III. is clear when compounded, but the strychnine hydrochloride reacts with potassium iodide, and strychnine hydriodide begins to separate in a few hours. No. IV. is a hopeless case of incompatibility, the alkaloid being precipitated as iodohydrargyrate.

Magnesii Sulphas.—Although magnesium sulphate gives immediately with soluble alkaline carbonates a precipitate of magnesium carbonate, with many tap-waters no precipitate is formed. For example, the following gives an immediate precipitate if dispensed with distilled water, but none with London tap-water :—

Ammonii carbonatis	.	.	.	.	.	℥iss.
Magnesii sulphatis	.	.	.	.	.	℥j.
Spiritus chloroformi	.	.	.	.	.	℥ss.
Tincturæ nucis vomicæ	.	.	.	.	.	℥ij.
Aquam	.	.	.	.	.	ad ℥xij.

Fiat mistura.

Doubtless the presence of chlorides in the tap-water prevents precipitation of magnesium carbonate, for ammonium chloride is used for that purpose in distinguishing between magnesium and calcium salts. There is a limit to the prevention of a precipitate, and tap-waters vary in preventive power, but the point for dispensers and prescribers to note is that a chloride may with advantage be added to such a mixture as the above.

I.						II.					
Magnes. sulphat.	.	.	.	℥ij.		Mag. carb. pond.	.	.	.	℥iv.	
Tr. rhei co.	.	.	.	℥j.		Mag. sulphat.	.	.	.	℥iij.	
Tr. zingib.	.	.	.	℥j.		Aq. menth. pip.	.	.	.	ad ℥xij.	
Aq. menth. pip.	.	.	.	ad ℥vj.		M.					

M.

Although the sulphate dissolves easily in its own weight of water, it is practically insoluble in alcohol; hence, on adding the tinctures of No. I. to the solution of the salt, the mixture becomes almost solid in a few minutes from separation of the sulphate. No. II. mixture exhibits a characteristic common to magnesium salts—viz., that under certain conditions of

hydration they form cements. Owing to the large amount of sulphate in this mixture, the suspended hydrocarbonate gradually aggregates, and in a few days forms a stone-like crust in the bottle.

Menthol is rarely prescribed for internal administration in mixture—in fact, the only prescription which we have met with is the following :—

Mentholis	.	.	.	.	.	.	ʒj.
Tincturæ cardamomi compositæ	.	.	.	.	.	.	ʒj.
Aquam chloroformi	.	.	.	.	.	.	ad ʒxx.

Fiat mistura.

The normal procedure in this case is to dissolve the menthol in the tincture, and add to the chloroform-water, the result being that the menthol is thrown out in indiffusible form. Acacia mucilage is useless for suspension in this case, but an ounce of rectified spirit provides a fairly good mixture. If the menthol is reduced to powder and triturated with an ounce of acacia mucilage, and water then added, a presentable mixture is obtained ; but the best plan of all for administering menthol and substances like it in aqueous mixture is to dissolve in four times their weight of olive oil, and emulsify with acacia.

Olea Essentialia.—The remarks in regard to the preparation of aromatic waters (page 52) must be considered in connection with aqueous mixtures containing excess of essential oils. It has been shown that the solubility of oils in water rarely exceeds 1 minim per ounce, and that the rapidity of solution is increased by dividing the oils into small particles, as by triturating with magnesium carbonate or any other powder, or by dissolving in spirit and pouring the solution into water, when the oil dissolved is precipitated in small particles. This latter example shows the condition which the dispenser should aim to get any essential oil into when it is in excess in mixture, and to keep it in that condition by a suitable emulsifying agent, such as acacia. On the next page are examples which do not come within this rule.

I.	II.
Calcii hypophosph. . . . 3j.	Ol. anisi mxxv.
Liq. Fowleri 3ss.	Tr. cardam. co. . . . 3ss.
Glycerin. pur. . . . 3iij.	Aq. menth. pip. . . . 3vj.
Ess. limonis 3j.	Aq. chlorof. . . . 3vj.
Aq. chloroformi. . . . ad 3vj.	Fiat mistura.
M.	Sig. : 3j. p.r.n.
Sig. : One tablespoonful with a tablespoonful of cod-liver oil, &c.	

What is *ess. limonis*? There is no official preparation of that name, but oil of lemon is commercially known as essence of lemon. It will not, however, make a nice mixture in the case of No. I., but a soluble essence of lemon (or its equivalent, a 1-in-1 tincture of fresh lemon-peel) produces a mixture of good flavour, which goes well with cod-liver oil. Note the chemical incompatibility of the first two ingredients; fortunately the limited reaction and the presence of glycerin (which should be mixed with the Fowler's solution) prevent a precipitate of calcium carbonate. No. II. was dispensed clear by using spirit and a minim of chloroform instead of *aq. chloroformi*.

Phenazonum.—This is the B.P. name for antipyrin or phenyldimethylisopyrazolone, $C_6H_5(CH_3)_2C_3HN_2O$. In some respects phenazone may be regarded as an artificial alkaloid, but its characters are *sui generis*: (1) it is alkaloid-like in being an aniline derivative; (2) it is unlike alkaloids in its great solubility (it is a free 'base'); (3) like them it gives heavy precipitates with alkaloidal reagents; and (4) it differs from most medicines in being a potential synthetic dye—that is, although a colourless substance, it is on the verge of colour-production, and certain reagents (occasionally prescribed with it) produce the colour. Again, we have in phenazone an excellent example of the importance of chemical knowledge to the dispenser. The characters of the substance may be classified thus:—

It is precipitated—

As insoluble tannate by tannic acids, therefore is incompatible with galenical preparations containing tannin.

As insoluble salicylate in certain mixtures of phenazone and alkaline salicylates.

As hypnal by chloral hydrate (see page 286).

Similar precipitates are given with phenol solutions and with beta-naphthol.

As iodo-antipyrin with free iodine in excess.

As a mercury compound (white) with mercuric chloride in certain proportions.

It is coloured—

Green with nitric and nitrous acids, owing to the formation of iso-nitroso-antipyrin, and similarly with spirit of nitrous ether or other alkyl nitrites in presence of water and oxygen (see below).

Red with ferric chloride, and

Yellow on the addition of sulphuric acid to the ferric-chloride mixture, the same effect being produced by alum alone, no doubt owing to the minute traces of iron in commercial alum and the ionisation¹ of the sulphuric radicle in it.

The following prescriptions from every-day practice illustrate a few of these reactions. Although antipyrin salicylate (salipyrin) is but feebly soluble in water (1 in 200), fairly strong solutions of antipyrin and sodium salicylate in distilled water may be mixed together without precipitation of antipyrin salicylate—indeed, water seems to split up the salipyrin, precipitating a small amount of salicylic acid, as in the following case :—

I.	II.
Antipyrin. . . . ʒij.	Antipyrini gr. xv.
Sodii salicylat. . . . ʒij.	Vin. antim. . . . ʒj.
Aquam sambuci . . . ad ʒvj.	Spt. æther. nit. . . . ʒij.
Fiat mistura.	Tr. toltutanæ ʒiij.
	Liq. ammon. acet. . . . ʒiij.
	Aq. chloroformi . . . ad ʒij.
	Fiat mistura.

¹ Ionisation is the condition in which chemicals are supposed to exist in solution, with their constituent radicles in the free state not as molecules, but as atoms electrically charged with positive or negative electricity, according to the nature of the radicle, and, therefore, in a condition which renders the radicles extremely susceptible to unite with or neutralise other radicles which may be brought into the field of their action, especially if the new radicles are a truer complement to them.

The two solids of No. I. dissolved separately (each in half the water) gave clear solutions, but on mixing a fine crystalline precipitate appeared in a few minutes. This does not happen with plain distilled water, but if it be feebly acidified with acetic acid, the same crystalline precipitate appears, although the amount of acid is insufficient to precipitate salicylic acid from the sodium salicylate. Observations by Millard and Stark show that the oily mixture of antipyrin and sodium salicylate is slightly alkaline, but when water is added, the reaction becomes acid.

A correspondent of *The Chemist and Druggist* observed that if he dissolved the antipyrin of No. II. in the chloroform-water and added it to the other ingredients previously mixed, no green colour developed. This is no doubt owing to the fact, noted on page 73, that ammonium acetate and ethyl nitrite interact, so that there is free acetic acid in the mixture instead of free nitrous acid, consequently no green colour is produced. Professor Chas. Caspari, jun., having questioned the statement that the mixture does not become green, and, if so, that the fact is due to the ammonium-acetate solution being alkaline, Mr. T. Dunlop experimented and proved the correctness of the first observer's statement (*C. & D.*, 1898, i. 357, 497). It is advisable in any case to add a little potassium bicarbonate to mixtures containing antipyrin and spirit of nitrous ether so that the green colour will not be produced. The observations of Evans (*C. & D.*, 1889, i. 402) proved that iso-nitroso-antipyrin is not poisonous, but Wood and Marshall (same volume) found that in acid solution iso-nitroso-antipyrin gives off on standing a small quantity of hydrocyanic acid—too little, however, to be alarmed about. Amyl nitrite in aqueous solution also gives the green colour, because it, also, liberates nitrous acid.

A.				B.			
Potass. bromid.	.	.	ʒij.	Antipyrin.	.	.	ʒss.
Chloral. hydrat.	.	.	ʒj.	Aluminis.	.	.	ʒj.
Phenazoni	.	.	ʒss.	Aquam	.	.	ad ʒiv.
Tr. capsici	.	.	ʒss.	Fiat mistura.			
Inf. gent. co.	.	.	ad ʒvj.				

A becomes green, and B (an Australian cough-mixture) changes to a beautiful golden-yellow colour.

Piperazinum. — This substance (diethylene-diamine, $2C_2H_4NH$) is strongly alkaline, and behaves like alkalis, *e.g.* :—

Liquoris strychninæ	ʒj.
Piperazini	ʒj.
Syrupi aurantii	ʒvj.
Aquam	ad ʒvj.

In this case replace 2 drachms of the syrup with as much acacia mucilage, and mix with the strychnine solution previously mixed with 3 ounces of water. Separately dissolve the piperazine in 2 ounces of water, add to the strychnine mixture, shake, and make up.

Potassii Chloras.—This chemical is one of the most dangerous of explosives because the conditions of explosion are almost unknown; the dangers, however, are confined to the dry substance. The salt in powder present in excess in aqueous mixture has a peculiarity of recrystallising as already explained. In association with anything which will liberate its oxygen it becomes a powerful oxidising body, and that is perhaps the reason why French observers state that potassium iodide and potassium chlorate should not be administered together; for even although the salts may not interact in a bottle, they do so as soon as they reach the stomach (the acids of the gastric juice liberating iodine). It is a pretty theory, but the following prescription by an eminent West-end physician has been repeatedly dispensed for the same patient without harmful result :—

Potassii iodidi	ʒij.
Potassii chloratis	ʒj.
Tincturæ iodi	ʒj.
Glycerini	ʒj.
Aquam	ad ʒiv.

Sig. : A teaspoonful twice a day in a wineglass of water.

Potassii Citras has, according to the British Pharmacopœia, 'a feebly acid taste'—*i.e.*, it contains a trace of free citric acid. Dispensers are apt to forget this, yet the acidity is sufficient to liberate a little salicylic acid in salicylate mixtures—*e.g.*, potass. cit. $\mathfrak{z}\text{ij}$., sodii salicyl. $\mathfrak{z}\text{j}$. in aq. $\mathfrak{z}\text{vj}$. This gives a fine crystalline precipitate (salicylic acid). A drop or two of liquor potassæ clears up the mixture.

Potassii Iodidum.—Reference to the index and p. 241 will show the more common incompatibles of alkaline iodides. Medical men now frequently prescribe acetyl-salicylic acid and potassium iodide in mixture, with the result that iodine is liberated. Mr. J. Tait found that the addition of 1 grain of sodium hypophosphite to a 6-ounce mixture containing pot. iodid. $\mathfrak{z}\text{ij}$. and ac. hydrobrom. dil. $\mathfrak{z}\text{iv}$. prevented liberation of iodine. Paraldehyde in potassium-iodide mixtures liberates iodine because the paraldehyde is usually acid. Such mixtures should be made faintly alkaline with potassium carbonate before adding the iodide.

Pulvis Tragacanthæ must be diffused through a fluid in which it does not readily dissolve (*e.g.*, spirit, glycerin, or syrup) before adding water ; otherwise a lumpy mixture results. The vessels used must be quite dry. A convenient mixture for the dispensing-counter is *tragal*—*viz.*, powdered tragacanth $\mathfrak{z}\text{ij}$., S.V.R. $\mathfrak{z}\text{j}$. Two to eight drops for each ounce of mixture.

Resorcinum.—Changes of colour in solutions of this substance are common. The following are two good examples :—

I.				II.			
Resorcini	.	.	$\mathfrak{z}\text{j}$.	Hydrarg. perchlor.	.	.	gr. iv.
Spt. ammon. arom.	.	.	$\mathfrak{z}\text{ij}$.	Resorcini	.	.	$\mathfrak{z}\text{j}$.
Syr. aurantii	.	.	$\mathfrak{z}\text{ij}$.	Spt. æther. nit.	.	.	$\mathfrak{z}\text{ij}$.
Aquam	.	.	ad $\mathfrak{z}\text{ij}$.	Spt. chloroform.	.	.	$\mathfrak{z}\text{ij}$.
				Aquam	.	.	ad $\mathfrak{z}\text{iv}$.

No. I. darkens in colour rapidly. This is owing to absorption of oxygen by the resorcin in presence of alkali. It behaves like hydroquinone and pyrogallol in this respect. No. II. becomes quite red, and stains skin and hair a caroty red. This combination is more common as a lotion, and is referred to later.

Sodii Salicylas.—The following are examples from practice of changes referred to on pages 71 and 72 :—

I.

Sodii salicyl.	. . .	ʒij.
Potass. bicarb.	. . .	ʒiij.
Morph. muriatis	. . .	gr. ss.
Aq.	. . .	ad ʒviiij.

Becomes almost black. Dissolve the bicarbonate in 6 ounces of aerated water, add the morphine dissolved in 1 ounce, and finally the salicylate.

II.

Sodii salicylatis	. . .	ʒiij.
Spt. ammon. arom.	. . .	ʒvj.
Aquam	. . .	ad ʒvj.

As bad as No. I., being deep orange in a few hours, and finally black. Prescribers say it is good therapeutically, the ammonia counteracting the heart-depression which the salicylate causes.

III.

Sodii salicylat.	. . .	gr. xv.
Spt. æther. nit.	. . .	ʒxv.
Aquæ camph.	. . .	ʒj.

This becomes almost black after standing a week or two, and a pleasant odour is developed. The latter is probably due to the formation of ethyl salicylate, and the colour to di- or tri-nitro-salicylic acid.

IV.

Diuretin.	. . .	ʒiij.
Caffein. cit.	. . .	ʒij.
Spt. æther. nit.	. . .	ʒij.
Inf. senegæ conc.	. . .	ʒiij.
Spt. chlorof.	. . .	ʒij.
Aq.	. . .	ad ʒvj.

Becomes red owing to the action of nitrous acid from the spirit of nitre upon the sodio-theobromine salicylate.

Syrupus Ferri Iodidi.—It is remarkable how many changes and reactions are met with in dispensing this preparation, which is universally 'official,' but differs in ferrous-iodide strength in different Pharmacopœias. The following are a few prescriptions which have come under our notice :—

A.

Syr. ferri iodid.	. . .	ʒvj.
Aq.	. . .	ad ʒvj.

Made with tap-water ferrous hydroxide is precipitated, and with any water containing oxygen ferric oxyiodide is thrown out slightly.

B.

Calcii chloridi	. . .	ʒiij.
Syr. ferri iodidi	. . .	ʒss.
Aq.	. . .	ad ʒiv.

A reddish-coloured separation of ferric hydroxide rises to the surface and is dissolved by a drop or two of dilute hydrochloric acid.

C.

Calcii chloridi	. . .	gr. 320
Potass. bromidi	. . .	gr. 320
Syrup. ferri iodidi	. . .	ad ʒiv.

Make this by dissolving the bromide in 2 ounces of simple syrup by the aid of heat and allowing to cool ;

then dissolving the calcium chloride in $\frac{1}{2}$ ounce of water and $\frac{1}{2}$ ounce of syrup, with enough dilute hydrochloric acid to produce a non-alkaline solution. Mix these solutions, and finally add sufficient concentrated liq. ferri iodidi (made with hypophosphorous acid as a preservative) to correspond with 4 ounces of syrup of iodide of iron, making up to 4 ounces with simple syrup.

D.

Potassii iodidi . . .	3iiss.
Syr. ferri iodidi . . .	3j.
Inf. calumbæ . . .	ad 3viij.

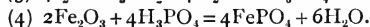
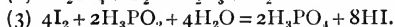
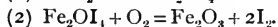
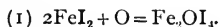
This mixture darkens in colour, becomes red, and precipitates ferric oxyiodide (Fe_2OI_4) owing to absorption of oxygen. This must be prevented, otherwise free iodine will ultimately be liberated. Acid. hypophos. m̄xv. prevents the change.

E.

Liq. sodii arsenat. . .	m̄xv.
Syr. ferri iodidi . . .	3j.

Ferrous arsenate is precipitated, but not if there is a trace of hypophosphorous acid in the syrup.

It is obvious from these examples that the neutral ferrous-iodide syrup of the Pharmacopœias is a mistake, for the changes referred to do not occur when the mixtures are compounded with syrup prepared from liquor ferri iodidi, a preparation which usually contains hypophosphorous acid to preserve it. Without this the ferrous iodide in the syrup is on the brink of precipitation. The following series of equations, suggested by Mr. D. B. Kidd, explain the precipitation in the first instance and re-resolution by hypophosphorous acid :—



A point which students should note is that this cycle of reactions does not go on *ad infinitum*; it is exceedingly limited, for a small amount of hypophosphorous acid delays precipitation so much that its inhibitory action must be attributed to something else than its deoxidising power. One very important combination with syr. ferri iodidi (*viz.*, with potassium chlorate) is referred to on page 376, as this incompatible is so serious that it should not be dispensed.

Tinctura Cardamomi Composita.—The colouring of this tincture is cochineal, which *per se* is used as an indicator in volumetric analysis of acids and alkalies. With distilled water the tincture gives much paler mixtures than with tap-water, because the latter is invariably alkaline, therefore darkens the colouring-matter. Generally a little fat is precipitated from the tincture on dilution with water, especially in presence of acids or salts which are not alkaline. Ammonium carbonate discharges the red colour, as in the following :—

I.	II.
Bismuth. carb. . . . ʒij.	Sodii bromidi . . . ʒiv.
Potass. bicarb. . . . ʒiss.	Ammon. carb. . . . ʒj.
Spt. ammon. arom. . . ʒiij.	Tr. chlorof. co. . . ʒij.
Tr. card. co. . . . ʒiij.	Aq. . . . ad ʒviij.
Aq. calcis ad ʒviij.	M.
M.	

In both cases the mixture becomes colourless, and a slight precipitate is formed, due to the ammonium carbonate.

There is insufficient tannin in tr. cardam. co. to precipitate alkaloid from aqueous mixtures sufficiently strong in alkaloidal salt, *e.g.* :—

A.	B.
Calcii hypophosphitis . ʒj.	Tr. digitalis . . . ʒj.
Tinct. nucis vomicæ . ʒiij.	Tr. strophanth. . . ʒj.
Tinct. cardam. comp. . ʒvss.	Liq. strych. hydrochlor. . ʒxxxvj.
Infusum calumbæ . . ad ʒviij.	Tr. cardam. co. . . ʒiv.
	Aq. chloroformi . . ad ʒvj.

The precipitate in both is most voluminous when tap-water is used. With distilled water it is not so rapidly formed, the colouring-matter of the cardamoms and fat from tinctures also being in the precipitate. In the case of B the precipitate was traced to tannin in the cinnamon of tr. cardam. co.

Tinctura Cimicifugæ with acid and water in mixture precipitates a hard lump—this is how resinoids are made. The precipitate is diffusible if half a drachm of glycerin is added to each ounce of acidulated water before the tincture is poured in.

Tinctura Ferri Perchloridi.—This tincture and its equivalent, liquor ferri perchloridi, give some curious results now and then owing to interaction of the ferric chloride with other substances. Phosphoric acid is one thing that upsets the unwary dispenser. The following show what may happen :—

I.				II.			
Tr. ferri mur.	.	.	ʒj.	Liq. ferri perchlor.	.	.	ʒij.
Tr. digitalis	.	.	ʒj.	Spt. æther. nitrosi	.	.	ʒss.
Acid. phosph. dil.	.	.	ʒij.	Acid. phosph. dil.	.	.	ʒiss.
Syr. flor. aurant.	.	.	ʒss.	Liq. ammon. acet.	.	.	ʒj.
Aq.	.	.	ad ʒvj.	Glycerini	.	.	ʒj.
				Aq. chlorof.	.	.	ad ʒvj.

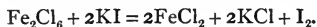
The first of these, compounded in the order of the ingredients, is inky owing to the tannin of the digitalis combining with the iron ; but if the tr. ferri mur. and acid. phosph. dil. are mixed together, diluted with half the water, then the syrup and tincture added, there is no inky tinge about the product. Ferric phosphate is precipitated in No. II., and cannot be avoided owing to the interaction of liq. ammon. acet. with phosphoric acid and liberation of acetic acid, in which ferric phosphate is insoluble. Liq. ammon. acet. may as well be left out, seeing that the diaphoretic effect of ammonium acetate is lost. A precipitate of ferric phosphate is in some other cases unavoidable, as in the following, but the density of the precipitate varies with the way of mixing :—

III.				IV.			
Tr. ferri perchlor.	.	.	℥ 80	Quinin. sulph.	.	.	gr. xvj.
Acid. phosph. dil.	.	.	ʒij.	Magnes. sulphat.	.	.	ʒiv.
Tr. nucis vom.	.	.	ʒij.	Tr. ferri perchlor.	.	.	ʒiij.
Spt. chlorof.	.	.	ʒiv.	Acid. phos. dil.	.	.	ʒiss.
Aquam	.	.	ad ʒviiij.	Glycerini	.	.	ʒij.
Ft. mist.				Liq. strychninæ	.	.	℥ 80
				Inf. quassiaæ	.	.	ad ʒviiij.

If in No. III. the tincture of iron perchloride and acid be mixed together, and then diluted, a heavy precipitate will fall

at once, increasing in density until about the third day, when the maximum is reached. Dilution of the tincture and acid separately before mixing causes the precipitate to fall slowly and in a very finely divided, almost gelatinous, condition. In No. IV. the magnesium sulphate promotes precipitation of ferric phosphate, but if the phosphoric acid is added last, the separation is retarded.

Tinct. ferri perchloridi and all other ferric salts (except the scaled citrates) reduce potassium iodide on mixing solutions, free iodine being precipitated as a black sediment if the potassium iodide is not present in sufficient quantity to keep it in solution. The following equation explains the reaction:—



Potassium citrate prevents the liberation of iodine; thus mixture V. is loaded with iodine, and mixture VI. is a yellowish-green solution, destitute of free iodine and remaining so for months:—

V.			VI.		
Potassii iodidi	.	3iss.	Potassii iodidi	.	3ij.
Tr. ferri perchloridi.	.	3ss.	Tr. ferri perchlor.	.	3ij.
Aquam	.	ad 3vj.	Potassii citratis	.	3iij.
			Aquam	.	ad 3vj.

Mr. Wm. Duncan considers that potassium ferric citrate ($\text{K}_2\text{FeO}, \text{C}_6\text{H}_5\text{O}_7$) is formed in the latter case. Alkaline citrates thus have the effect of keeping iron solutions together, as it were. Here is another instance:—

Liquor. ammonii acetatis	.	.	.	.	3iss.
Tr. ferri perchloridi	.	.	.	.	3ij.
Glycerini	.	.	.	.	3j.
Aquæ	.	.	.	.	3viiij.
Misce et adde					
Potassii citratis	.	.	.	.	3iij.
Aquæ	.	.	.	.	3x.

Any other way of mixing these gives a different result.

A similar reaction occurs with bromides, but not always, as the following show:—

I.	II.
Ammon. bromid. . . . 3v.	Liq. ferri perchlor. . . . 3iij.
Tr. ferri perchlor. . . . 3iij.	Acid. hydrobrom. dil. . . . 3iij.
Tr. nucis vom. . . . 3ij.	Quininæ sulphat. . . . gr. xij.
Spt. chloroformi 3j.	Tr. gelsemii 3iss.
Aquam ad 3iv.	Spt. chloroformi 3ij.
M.	Syr. aurantii 3ij.
	Aquam ad 3vj.

Bromine was detected in No. I. by the dispenser, but although No. II. becomes of a deep red colour, Mr. Harold Wyatt found that this was not due to free bromine, but to ferric bromide.

Mucilage of acacia is incompatible with tincture of perchloride of iron, a slimy ferric arabate being precipitated; but in some cases it is possible to dispense a clear mixture. The following instance is almost historic through frequent reference to it by the late Joseph Ince:—

- (1) Tinct. ferri mur. 3ij.
 - (2) Spt. æther. nit. 3ss.
 - (3) Mucilag. acaciæ 3j.
- Syrup. q.s. (*i.e.*, 10 drachms) ut ft. . . . 3iij.

Mr. Ince said that, made most ways, this combination assumes the form of a thick jelly, which may be sent out in a covered pot. Reason thus:—Here are three ingredients likely to react upon each other, of which mucilage is chief. There are 10 drachms of protective agent (syrup) at disposal; divide it into 3ij. with the tincture, 3iij. with the spirit of nitrous ether, 3v. with mucilage, which wants it most. Combine the three solutions, and a beautiful preparation is the result.

Occasionally we have seen tr. ferri perchlor. and spt. ammon. aromat. prescribed together, generally in about equal proportions. They are clearly incompatible, but the mixture is a most useful hæmatinic, being much less styptic than tr. ferri perchlor. alone, and that appeared to be known to the prescriber who, in the old days of spt. ammon. co., P.L. (a preparation of most uncertain alkalinity), wrote this prescription:—

- Tr. ferri muriatis 3v.
 Spt. ammon. comp. 3iij.

On mixing, effervescence (CO_2) took place, with some precipitation, which quickly resolved itself, and a nice reddish solution resulted.

Tinctura Nucis Vomicae.—The fact that this preparation contains a trace of copper as well as igasuric acid has been mentioned (page 242). The tincture gives an opaque mixture with water owing to inert fatty matter being precipitated. Filtration is therefore permissible. A drachm of the tincture in an ounce mixture gives a diffusible precipitate of alkaloids with spt. ammon. arom. ʒj. , or liq. potassæ ℥xx. , or liq. ammon. ℥xx.

Vinum Ferri and Alkalies.—If iron wine is properly made the following gives a precipitate of ferrous hydrocarbonate with the potash:—

Vin. ferri, B.P.	.	.	.	.	.	.	ʒiv.
Potass. bicarb.	.	.	.	.	.	.	ʒiiss.
Tr. nucis vom.	.	.	.	.	.	.	℥lxxx.

Some send out a mixture like this clear. A case was investigated, and it was found that the iron wine which had been used contained a mere trace of iron, and what there was in it was kept in solution owing to the presence of citrate of potash. Vinum ferri and liquor arsenicalis are sometimes prescribed together, the result being a repulsive-looking muddy mixture. Liquor arsenici hydrochlor. should be prescribed instead of the alkaline solution. The following example of this kind has been reported by Mr. Archibald Currie:—

Liq. arsenicalis	.	.	.	.	.	.	ʒij.
Syr. simplicis	.	.	.	.	.	.	ʒij.
Vin. ferri	.	.	.	.	.	.	ʒj.

The first time the mixture was dispensed it was clear; on the second occasion it contained a green precipitate. Two different wines were used. On testing these a trace only of iron was found, and in the ferric condition, in No. 1, while No. 2 contained 0.47 per cent. in the ferrous state, with a trace of ferric. No. 1 was a year old, faintly acid, and was a rich, full-bodied, rather sweet sherry, while No. 2 was new, dry, and

faintly acid. The precipitate in the mixture made with No. 2 consisted of a mixture of ferric and ferrous hydroxide.

Volatile Ingredients in Mixtures.—Volatile substances should never be mixed with hot fluids. If a salt has to be dissolved in an infusion freshly prepared, or in hot water, either should be made quite cold before adding such things as ether, ammonia, or hydrocyanic acid; then cork quickly and shake thoroughly. Never put such volatile ingredients into an empty bottle and then fill up with water; put the water in first, leaving just room enough for the volatile ingredient—for two reasons: firstly, because the empty space in the bottle becomes charged with the volatile vapour, which is displaced when filling up; and, secondly, what is perhaps not often taken into consideration, most of the vapour from the bottle being filled passes into the water-bottle used for filling it. For instance, in making a chlorine gargle one puts potassium chlorate and hydrochloric acid into an empty 12-ounce bottle, which rapidly becomes charged with chlorine-vapour. Now take a bottle containing 30 ounces of distilled water, and fill up the gargle. In so doing most of the 12 ounces of chlorine-vapour will pass into the water-bottle and contaminate the next thing the water-bottle is used for. A case is on record where a dispenser noticed iodine liberated in a bottle of medicine containing potassium iodide. He could not account for it at all, but at last found that the water-bottle had just previously been used to fill up a mixture containing spirit. æther. nit., the vapour of which passed into the water-bottle, was absorbed, and carried into the next bottle of mixture, containing potassium iodide. Make it a rule that when a mixture is not made up to the required volume in a measure the requisite quantity of water should be placed in a measure and poured therefrom into the medicine-bottle.

Zinci Bromidum may be taken as typical of halogen salts of metals. Usually dispensers are apt to regard bromides as unchangeable or unprecipitable compounds. The following is an example of the error:—

Zinci bromidi	.	.	.	.	.	.	gr. xvj.
Sodii bromidi	.	.	.	.	.	.	ʒss.
Tincturæ nucis vomicæ	.	.	.	.	.	.	℥XLV.
Aquam.	.	.	.	.	.	.	ad ʒviiij.

With one sample of sodium bromide this prescription gave a mixture with a flocculent precipitate of zinc hydroxide and carbonate, due to the presence of free alkali in the sodium bromide. A few drops of dilute hydrobromic acid sufficed to clear the mixture. A similar expedient may be adopted in other cases in which a metallic hydroxide is precipitated to a slight extent owing to traces of alkalies; but sometimes the addition of acid must anticipate precipitation, as there are hydroxides which do not redissolve readily once they are formed.

ADMINISTRATION OF MIXTURES.

When mixtures are to be administered in parts it will be found that bottles of best quality with moulded graduations are fairly reliable. It is easy to tell at a glance any that may be seriously inaccurate. In dispensing potent medicines, the accuracy of the bottom graduation should always be ascertained, and in all cases the top dose should be correctly measured in. Printed slip graduations may be grossly inaccurate unless used as follows: Measure one dose into the bottle, affix the slip so that the bottom dose-mark is level with the liquid; also measure in the top dose when finished. The nearest approach to perfection is in the use of a blank slip graduated by hand; affix the slip to the empty bottle, and, if of variable calibre, measure in and mark each dose. Bottles having sides of nearly uniform thickness may quickly be satisfactorily graduated thus: Affix the slip, measure in and mark one or two doses (using the prescribed vehicle for the purpose), dispense, and when filled up pour back one dose into the measure and mark the level of the liquid in the bottle; finally divide the ungraduated space into equal divisions of the requisite number.

EMULSIONS.

AN emulsion is a mixture of small particles of solid or liquid substances in a liquid vehicle, the particles being kept in suspension, or easily diffusible, and prevented from coalescing by means of a body called an emulsifier. Many examples of such mixtures occur at the dispensing-counter, but the term 'emulsion' is generally reserved for fluid aqueous mixtures of oils and oleo-resins. In the widest sense it includes any liquid preparations containing something in suspension but not dissolved and not easily separable. For example, a mixture of tr. quininæ ammon. in water, with the quinine hydrate kept from adhering to the sides of the bottle by means of mucilage, is, strictly speaking, an emulsion, but is not generally so regarded by dispensers. Hence, such mixtures are not included in this chapter; but we ought properly to regard as emulsions all

MIXTURES WITH RESINOUS TINCTURES.

Students will find it advantageous, in their reading about tinctures and fluid extracts, to distinguish between those which mix clear with water and those which do not. First, they should note the constituents of the drugs and the menstrua employed to exhaust them. Here they will learn if the active constituents are water-soluble, in which case a weak alcohol or water alone is the menstruum used to exhaust them, the function of the spirit being to preserve the preparation resulting. Tincture of opium is a good example of these. They form clear mixtures with water. Secondly, students will observe and collate a group of preparations which contain resins, essential oils, and other water-insoluble active substances. These can be divided into two broad classes: (1) Preparations

containing resins, with little other dissolved material, so that on adding water to them a milky mixture is formed, in which the resinous particles more or less rapidly coalesce, and the active substance is thus completely precipitated. Tincture of Indian hemp is a good example of this class. It is impossible to dispense them without a suspending agent or emulsifier.

(2) A second class consists of most of the fluid extracts containing resinous bodies, tinctures of gum-resins, and aromatic or resin-containing drugs which are made with the weaker alcohols. These contain extractive matter, which, under certain conditions, suffices to prevent the precipitated particles from coalescing, and so maintains the emulsified condition. Preparations of this latter class do not usually require mucilage, especially as they are frequently prescribed with other ingredients containing extractive or saccharine matter; and if in any case an alkali is present, this may suffice to saponify enough of the resinous substance to make a perfect emulsion.

The rule to follow generally in regard to the compounding of resinous fluids in aqueous mixtures is: Mix with the water everything except the resinous fluid, which add last and gently shake. If, for example, it is a mixture like this:—

Tr. asafetidæ	.	.	.	.	.	.	℥ss.
Spt. ammon. arom.	.	.	.	.	.	.	℥ss.
Glycerini	.	.	.	.	.	.	℥iij.
Aquam	.	.	.	.	.	.	ad ℥viij.

Put into the bottle the glycerin, spirit, and 6 ounces of water; shake; now pour in the tincture in a thin stream without touching the neck of the bottle, shake gently, and make up. Custom sanctions the use of a long-necked funnel to introduce the resinous tincture into the centre of the mixture so that it can be shaken up with the other constituents before any of it in undiluted condition has come into contact with the side of the bottle. The paper cone mentioned in connection with the next mixture serves the same purpose and saves the trouble of cleaning the funnel neck.

In some cases it is advisable, should a strong alcoholic preparation be prescribed along with the resinous one, to mix

both before adding to the water, the object being to get the precipitated resinous particles as small as possible. For the same reason the resinous preparation is poured into the largest possible volume of aqueous fluid. Tinctures of guaiacum and Indian hemp cannot be dispensed in aqueous mixtures unless mucilage or a similar substance is used. The best *modus operandi* is to take a measure of acacia mucilage equal to that of the tincture, dilute it with as much water as possible, pour in the tincture, and gently agitate. When much water has to be added, the finished mixture should not contain less than ℥xx. or 3ss. of mucilage to the ounce. Syrups, even if present in considerable quantity, do not effectually prevent deposition of resin. The following is another example :—

Vin. colchici	3j.
Potass. bicarb.	3ss.
Tinct. cannab. ind.	3ss.
Spt. ammon. co.	3j.
Tinct. calumbæ	3ij.
Tinct. gentianæ	3ij.
Aquam	ad 3vj.

A good mixture may be made as follows : Mix in a dry measure the tincture of cannabis with the sal volatile and other tinctures. Dissolve the potash salt in about 4 ounces of water, and add the wine. Now make a small cone of white paper with a small opening at the apex. Immerse the apex of the cone just beneath the surface of the bicarbonate solution (which may be held in a 4-ounce measure), and shoot in the tinctures through the cone, which must be quickly and simultaneously more deeply immersed ; remove it, stir the mixture, bottle, and finish. Only slight precipitation takes place after several hours, but the dispenser should take into consideration the vicissitudes which the mixture will undergo during the following six or eight days, and remember that the last dose should be as nearly as possible like the first. It is, therefore, better in the last case to stir 3ij. of mucilage with 3vj. of water, and add the cannabis tincture gradually while stirring ; dilute to 3 ounces, add the remaining ingredients, the potash

being dissolved in a little water and added last. The following is a recent prescription containing a resinous extract :—

Ext. cannab. ind.	. . . . .	℥ss.
Mist. cretæ	. . . . .	ad ℥viii.

The simplest procedure to make a nice mixture of this is to place the extract on the bottom of a mortar, warm the mortar over a water-bath until the extract becomes soft, add to it 80 grains of powdered acacia, and rub well and firmly till the extract is all taken up by the acacia and a dampish uniformly green powder results; then add the chalk mixture a little at a time with steady trituration till the acacia and the extract are equally distributed. The result is a nice green mixture free from dark specks, which are usually the trouble in such mixtures.

With large quantities of resinous tinctures or concentrated mixtures of them the addition of mucilage is essential, as in the following :—

I.		II.	
Potassii iodidi	. . . . . ℥iss.	Tinct. cannabis indic.	. . . . . ℥iv.
Tr. cimicifug.	. . . . . ℥j.	Tinct. digitalis	. . . . . ℥j.
Tr. guaiaci am.	. . . . . ℥j.	Ext. taraxaci	. . . . . ℥iv.
Tr. nucis vom.	. . . . . ℥iss.	Ammon. chlor.	. . . . . ℥iv.
Aq. chloroformi	. . . . . ad ℥iv.	Aq. chlorof.	. . . . . ad ℥vj.

No. I. can be made a good mixture by the addition of acacia. Make a mucilage of 2 drachms of the powdered gum with $\frac{1}{2}$ ounce of chloroform-water; dissolve the iodide in the rest of the water, and mix the mucilage with it; then mix the tincture of guaiacum with the other tinctures and add to the whole of the watery mixture with gentle agitation. It may be noted that recently prepared tinct. guaiaci ammon. poured into water containing 25 per cent. of fresh acacia mucilage forms a nice milky emulsion, but an old sample of tincture with stale mucilage produces an unsightly curdy mixture. In the case of No. II. the taraxacum extract is a good substitute for mucilage. Rub the extract down with about 2 ounces of the water, pour in the mixed tinctures, nearly fill the bottle with aq.

chlorof., and add the ammon. chlor. dissolved in the rest of the aq. chlorof.

Spt. æther. nit.	℥ss.
Tr. toluanae	℥ss.
Tr. camph. co.	℥j.

If this be mixed in different ways it will present different appearances. The principle to be borne in mind here, as in all similar cases, is that it is far easier to keep a substance in solution than it is to take it up again after precipitation. In the instance before us it is evident that the substances should be mixed in the order of their percentage of alcohol—that is, the spirit of nitre should be mixed with the tinct. tolut., and the tinct. camph. co. added gradually with agitation.

I.		II.	
Thymol.	gr. xxx.	Tr. benzoini co. . . .	℥ 320
Spt. chloroform. . . .	℥ij.	Oxymellis scillæ . . .	℥j.
Tr. benzoin. co. . . .	℥ij.	Vini ipecac.	℥ 80
Magnes. calc. levis . .	gr. x.	Syrupi tolut.	℥ 80
Aquam.	ad ℥ij.	Aquam	ad ℥vij.
Fiat vapor.		M. Ft. mist.	

The best plan for No. I. is to mix the tincture and the spirit, and dissolve the thymol in the mixture. Then mix the magnesia with 10 drachms of water, and pour the spirituous mixture into it. Light magnesia must be used. Mucilage is inadmissible owing to the alcoholic strength of the preparation. The light carbonate of magnesia is largely employed in making the quasi-emulsion inhalations of such essential oils as oleum pini sylvestris and oleum pini pumilionis. These are generally dispensed by mixing with a small quantity of the light carbonate in a mortar and adding the water. In this way the use of spirit, which might be therapeutically inapplicable in some throat cases, is avoided. No. II. prescription requires the addition of $\frac{1}{2}$ ounce of acacia mucilage.

One mixture of a resinous tincture with water may be mentioned as a useful cosmetic, making, it has frequently been stated, a perfectly suspended milky compound. It is known as *Lait Virginal*, and is composed of tinct. benzoini ℥ij. and

aquæ rosæ ℥vj. This cannot be made into an inseparable mixture without the addition of a few drachms of acacia mucilage.

Tincture of tolu is frequently prescribed in cough-mixtures, and it is desirable that the tolu should be dispensed in a permanent milky condition. If senega or quillaia is in the mixture, the dispenser will bear in mind that the saponin in these bodies is one of the best emulsifying agents, therefore the tincture of tolu should be added to the senega or quillaia preparation. The properties of these saponin emulsifiers are discussed later.

Potassii iodidi	.	.	.	.	.	℥j.
Potassii bicarbonatis	.	.	.	.	.	℥ij.
Tincturæ quillaiaë	.	.	.	.	.	℥ss.
Tincturæ toluanae	.	.	.	.	.	℥vj.
Elixir simplicis	.	.	.	.	.	℥ij.
Aquam chloroformi	.	.	.	.	.	ad ℥viiij.

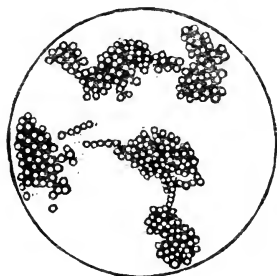
Fiat mistura.

There is insufficient quillaia here to keep the tolu suspended. A dispenser made a good mixture by the addition of pulv. tragac. co. ℥j. This was mixed with 2 ounces of chloroform-water, the elixir and tincture of quillaia added, then the tincture of tolu, and lastly the salts dissolved in the rest of the water.

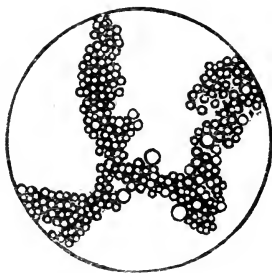
OLEAGINOUS EMULSIONS.

Milk is the ideal emulsion. It is a mixture of almost equal small percentages of fat and emulsifying agents with sugar and water; the fat separates on standing, but is easily distributed again, and the fat particles coalesce (de-emulsify) with great difficulty. Cow's milk contains on the average 3·6 per cent. of fat, 3·3 per cent. of proteids (casein and albumin), 4·8 per cent. of milk sugar, 0·73 per cent. of inorganic salts, and the rest water. Casein is the emulsifying agent, but the albumin plays its part in this respect, and it seems as if the fat particles were covered by an extremely thin skin of proteid, whereby de-emulsification is prevented.

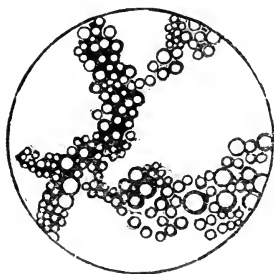
The emulsions which chemists generally have to prepare are much richer in fat than milk is, but compounders have to keep the ideal in view, for a perfect emulsion is one in which the oil-globules are invisible to the naked eye. Something short of this may look well, but it is only when the more perfect form is attained that it can safely and properly fulfil all its requirements in dispensing.



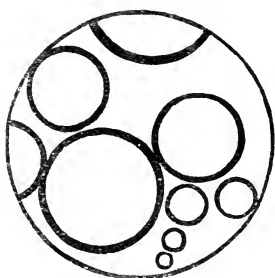
A



B



C



D

The figures given here illustrate the various degrees of perfection and badness of emulsification. A shows the appearance of milk under the microscope; B is a cod-liver-oil emulsion made with yolk of egg; C is a cod-liver-oil emulsion made with acacia; and D one made with tragacanth. These are magnified about 100 diameters.

Several B.P. preparations are emulsions, *e.g.* :—

Linimenta Ammoniae, Calcis, et Hydrargyri, in which some alkali forms soap with an oil, and the resulting soap emulsifies the rest of the oil.

Mistura Ammoniaci.—Ammoniacum is a gum-resin containing 2 per cent. of essential oil as well as 28 per cent. of gum and the rest resin. There is sufficient gum in it to keep the resin and oil in suspension when the whole is rubbed with water to a thin paste and further diluted. This may be called a 'natural emulsion.'

Mistura Amygdalæ.—If sweet almonds are skinned, beaten to a paste, and water added, a white emulsion is formed, which, however, soon separates oil, because there is less than 1 part of emulsifier (gum) in the almonds for every 5 parts of oil. The B.P. therefore adds gum acacia and sugar to the almonds (*pulv. amygdalæ co.*), and this mixture forms with water a good emulsion.

Mistura Guaiaci.—Here the artificial emulsifiers gum tragacanth and sugar are added to keep the particles of guaiacum resin from coalescing.

Mistura Olei Ricini.—In a litre mixture 100 grammes of powdered acacia is employed to emulsify 375 millilitres of castor oil, sufficient orange-flower and cinnamon waters being used to complete the emulsion.

Mistura Scammonii (*B.P.* 1885).—A mixture of scammony (gum-resin) and fresh milk. There is a fair proportion of gum in scammony (about 20 per cent.), but insufficient to emulsify it with water, and the milk supplements its influence.

EMULSIFYING AGENTS.

Acacia Gum is the principal gum employed by pharmacists. It is typical of a large class of bodies which emulsify oils, but few of them equal it in convenience and power. The gum contains the calcium, magnesium, and potassium salts of arabic acid, but there are many varieties of the gum, and they differ in composition and emulsifying power. From the nature of the emulsions of oils formed by acacia it is safe to assume that the oil exists in the emulsion in a similar condition to the fat in milk—that is, the particles are coated with a film of gum (probably in molecular association with the oil); this prevents coalescing, and the viscosity produced in the mixture prevents separation. The fact that the acacia gums which are the poorest emulsifiers generally give the most viscous mucilages indicates that the filming process has something to do with perfection of emulsification, these poor gums being less rich in

the arabates than gums answering the official description. The so-called 'English method' of using gum acacia in emulsifying oils is to triturate 1 part of the powdered gum in a mortar with 2 parts of oil, add at one time $1\frac{1}{2}$ part of water, and triturate, when, after a few turns of the pestle, the whole is emulsified. The rest of the water may be added by degrees. At least 3 parts of the powdered gum is required for 8 parts of an essential oil, and 2 parts for 8 parts of fixed oils and balsams, but double these quantities is generally required, according to the amount of water which is present. Why the dry-gum method should be called 'English' by American writers we do not know, for the other, or 'continental,' way (as exemplified by *mistura olei ricini*) is as commonly followed. Powdered acacia of commerce is not well suited to the preparation of emulsions. It usually contains dust particles, and frequently in sufficient quantity to give the emulsion a grey appearance. Besides, it is nearly always very acid. The best procedure is to powder picked gum extemporaneously; or, if the operator prefer to work with mucilage, this can be prepared quickly from gum well ground down and triturated with the water. For manipulative details see page 337. Some acacias yield a mucilage affording a strong acid reaction. The amount of acidity, however, is very small, and to such mucilages it is permissible to add just sufficient liq. calcis sacch. to bring the acidity down until it very faintly changes the colour of blue litmus-paper, but not enough to produce alkalinity. As a point of commercial interest it may be noted that unpowdered acacia is much less expensive than commercial powder of equivalent quality.

Tragacanth Gum is much inferior to acacia gum as an emulsifier. It does not assist the compounder in dividing the oil into small particles, as acacia gum does, and its action is solely that of a viscid body—it keeps the oil-globules apart once they are formed. Its influence is well exemplified in the cod-liver-oil emulsion which is illustrated in D, page 314. Tragacanth is capable of doing much better than this when

powerful mechanical force is employed, but it is scarcely possible to do better at the dispensing-counter. A judicious use of acacia and tragacanth together produces the most serviceable emulsion. Emulsions prepared with acacia always separate unless an undesirable quantity of the gum has been used. Acacia breaks up oil beautifully, but, owing to lack of viscosity, it does not impart sufficient 'body' to the liquid to prevent separation. Tragacanth supplies the necessary viscosity: two or three grains to the ounce suffices, depending on the quantity of acacia used.

Starch is in some respects like tragacanth; that is to say, it is as good a suspending agent, but lacks the slightly gummy property of tragacanth. It is employed (as starch mucilage) for making iodoform emulsion, and for suspending or emulsifying medicines which are given by the rectum.

Yolk of Egg is a remarkable emulsifying agent. Sometimes the whole egg is used without disadvantage, if there is nothing in the mixture to coagulate the albumen. The yolk is itself an emulsion of 30 per cent. of fat with 16 per cent. of vitellin, a substance closely resembling the casein of milk in composition and properties. There are also a little albumen and various earthy and alkaline salts in egg-yolk. The vitellin may be regarded as the substantial emulsifying ingredient. It is particularly serviceable for limpid oils, such as turpentine, and it forms emulsions very quickly, perhaps because the emulsifier is a potential emulsion.

Milk is one of the best emulsifying agents for extract of male fern, and, strange to say, fresh milk does better than the skimmed variety, thus showing that emulsification is not entirely due to casein.

Casein prepared from milk is now obtainable, and is an excellent emulsifier. The casein may be made as follows: Take 1 gallon of milk and $2\frac{1}{2}$ ounces of solution of ammonia, and after shaking well set the mixture aside for twenty-four hours. Two layers are now observed, the semi-saponified butter above

and the lacto-serum below. The lower liquid is drawn off, and casein is precipitated from it by acetic acid. The magma is collected and strongly pressed to expel moisture; $2\frac{1}{2}$ drachms of sodium bicarbonate is now added by trituration, and, finally, enough sugar to obtain a powder representing when dry about 10 per cent. of its weight of casein. The preparation keeps well in securely corked bottles for at least three years. It has a slight, not unpleasant, smell, which is not appreciable in preparations. M. Léger, who suggested the use of casein in 1887, divides substances into (1) those soluble in alcohol, and (2) those insoluble. The first class, which includes resins, balsams, and oleo-resins, can be emulsified in a bottle. The product is first weighed or measured into the bottle, and enough alcohol is added to dissolve it. For a 4-ounce mixture use about $2\frac{1}{2}$ drachms of saccharated casein, dissolved in an equal weight of water, add the solution, thoroughly shake, and make up to the required volume with the rest of the water gradually introduced, with continual shaking. For oils a mortar is used. A piece of cheese—Gruyère or white Cheddar—is a splendid emulsifier: about an ounce to an 8-ounce emulsion. The oil should be triturated with the cheese, which to some extent dissolves in the oil, then the other liquids are incorporated. It is suitable only for emulsions to be consumed within a few days after it has been made. Like acacia it requires the aid of a viscous substance, such as tragacanth or Irish moss, to form a non-separating emulsion.

Irish Moss.—Cod-liver-oil emulsions have long been prepared with Irish moss. Mr. Peter Boa (Edinburgh) obtains a clear mucilage of the moss by straining the mucilage through absorbent cotton-wool supported on muslin in a hot-water funnel. The mucilage itself is prepared by digesting $\frac{1}{4}$ ounce of washed moss in 24 ounces of water for an hour, boiling for five minutes, and straining the moss mucilage. It serves as well as acacia for chalk mixture. For suspending copaiba it is superior to acacia—separation taking place much more slowly and less completely. Part of the copaiba remains in an

emulsified state at the bottom of the bottle when moss is used, but with acacia the whole rises to the top. For emulsifying cod-liver oil it is greatly superior to acacia in preventing separation, but finer division of the oil is obtained with acacia. Moss mucilage \mathfrak{z} vj., cod-liver oil \mathfrak{z} j., and water \mathfrak{z} ij. produce an emulsion that does not readily separate. Using \mathfrak{z} vj. acacia mucilage, \mathfrak{z} j. cod-liver oil, and \mathfrak{z} ij. water, the resulting emulsion soon separates. Irish-moss mucilage is *not* good for suspending heavy powders, such as bismuth subnitrate. It keeps well in full bottles. One of the chief drawbacks to the use of Irish moss in preparing extemporaneous emulsions is its variability. Every new supply requires to be standardised, so to speak. By the aid of strong machinery it breaks up oil very finely and it retains a tenacious grip of it. An emulsion made with it is less easily put out of gear than an emulsion made with gums or egg. Its employment is restricted mainly to manufacturing circles.

Malt Extract is considerably used for emulsifying cod-liver oil without any other emulsifier. The plan is to use a mortar which has been warmed well by filling with boiling water, the pestle also being warmed in the water; put the extract in the mortar, stir to liquefy it, and add the oil in small portions at a time, stirring well. The oil may be mixed with liq. calc. sacch. in the proportion of 5 minims to 1 ounce.

Gelatin has also been proposed as an emulsifying agent, especially for paraffin oils, and was the subject of a patent (No. 3466, 1886). According to this patent a solution of gelatin or other similar substance is made, in the proportion of 4 ounces to the gallon of water. In 12 parts of this 1 part of phosphate of soda or potash, or carbonate of soda or potash, is dissolved by the aid of heat, and this mixture is capable, by the ordinary means, of emulsifying from 24 to 36 parts of animal or vegetable oils. For embrocations ammonia is substituted for the above-named salts. Chloroform and such liquids may be emulsified in this manner. For mineral oils and the like the alkali is replaced by soft soap. For example, an emulsifying solution is made with 6 ounces of concentrated size, 1 pound

of soft soap, and 1 gallon of water, and this mixture is capable of emulsifying 2 gallons of paraffin oil. The following is an excellent example of the utility of gelatin :—

Ol. cadini	4 parts
Liq. plumbi fort.	3 parts
Glycerin.	5 parts
Aq.	97 parts

The prescriber expected this to form an emulsion, but it does not. Acacia gum, milk, and gelatin were tried as the emulsifiers, and the best results were obtained with $1\frac{1}{2}$ part of gelatin. This was soaked in 20 of the water, dissolved by gentle heat, the glycerin added, and 3 or 4 drops of liquor potassæ to neutralise the acids in the tar. The oil of cade was then added by degrees, stirring constantly, the emulsion diluted with 30 of water ; and finally the liq. plumbi was added, diluted with the remainder of the water.

Senega-root and Quillaia-bark contain a principle (saponin) which possesses powerful emulsifying properties and imparts to infusions of either of these drugs the frothing property which is not the least important of their characteristics. The late Mr. H. Collier, of Guy's Hospital, studied the use of a tincture of quillaia made by digesting 4 ounces of the coarsely powdered inner bark in 20 ounces of rectified spirit for a week, then filtering, but a proof-spirit tincture is equally good. This tincture is peculiarly valuable for converting an oil into an emulsion in presence of an acid ; for example :—

Cod-liver oil	℥j.
Glycerin	℥j.
Lime-juice	℥j.
Tincture of quillaia	℥ij.

This forms a very good emulsion.¹ *Ext. filicis maris* is a troublesome substance to emulsify, milk being one of the best vehicles. Although it may with care be turned into a perfect

¹ The tincture varies in saponin-content according to the alcoholic strength of the menstruum, and saponin *per se* is most reliable : $\frac{1}{4}$ grain of saponin and 2 grains of powdered tragacanth emulsify 1 ounce of any fixed oil with 1 ounce to $1\frac{1}{2}$ ounce of aqueous vehicle.

emulsion with acacia, the mixture is not at all pleasing in character. The following is, however, all that can be desired:—

Ext. filicis maris	.	.	.	.	.	.	3j.
Tr. quillaia	.	.	.	.	.	.	3ss.
Aq. destill.	.	.	.	.	.	.	ad 3j.

Oil of turpentine works well with its own measure of the tincture, *e.g.*:—

Ol. terebinthinae	.	.	.	.	.	.	℥xx.
Tr. quillaia	.	.	.	.	.	.	℥xx.
Aq. destillat.	.	.	.	.	.	.	ad 3j.

Resinous tinctures require more than their own volume of the quillaia tincture to prevent separation of resin; thus:—

Tr. toltan.	.	.	.	.	.	.	℥xl.
Tr. quillaia	.	.	.	.	.	.	3j.
Aq. destillat.	.	.	.	.	.	.	ad 3j.

Misce.

After a short time the resin deposits, but it readily diffuses on shaking. It will be found that in cases of this kind acacia acts better—it gives viscosity to the liquid, and thus helps to retain the separated resin. For the same reason acacia or tragacanth is better for resin of copaiba than quillaia—in fact, quillaia is at its best with oils and oleo-resins, and should be avoided for resins.

The rectified-spirit tincture is used in the preparation of liquor picis carbonis, the full-strength spirit being required to dissolve the coal-tar, and the quillaia to emulsify the mixture when it is mixed with water.

Resin Soap.—This is another agent which is used for the purpose of emulsifying phenolic bodies with water. Mr. Collier, whose observations on quillaia appear to have originated from a study of liquor carbonis detergens, obtained equally noteworthy facts from an analysis of creolin, in which a resin soap is present. Mr. Collier prepared resin soap by boiling 3xxx. of yellow resin and 3v. of caustic soda in 20 ounces of distilled water for two hours, replacing water occasionally. The mixture is allowed to cool, when a yellow pasty mass

separates, which is drained, squeezed as free as possible from liquid, dried over a water-bath until brittle, and reduced to powder. The powder is soluble in water, and is an excellent emulsifying agent. The following are examples of its utility :—

I.				
Fixed oil	.	.	.	℥j.
Resin soap	.	.	.	gr. x.
Water	.	.	.	℥j.

Dissolve the soap in the water and shake the solution with the oil.

III.				
Copaiba	.	.	.	℥j.
Resin soap	.	.	.	gr. x.
Water	.	.	.	to ℥j.

Prepare as No. I.

Sandalwood oil, creosote, and similar medicines are emulsified by this formula.

II.				
Volatile oil	.	.	.	℥ij.
Resin soap	.	.	.	gr. x.
Water	.	.	.	to ℥ij.

Proceed as in No. I. Excellent for inhalations.

IV.				
Thymol	.	.	.	gr. xvij.
Rectified spirit	.	.	.	℥ij.
Resin soap	.	.	.	℥j.
Water	.	.	.	to ℥ij.

Mix the first three, dissolve, and add the water.

Camphor and menthol may be similarly treated.

The resin soap is suitable for emulsifying almost any liquid of an oily nature.

THEORY AND PRACTICE.

From all that has preceded the compounder will have little difficulty in formulating a theory of emulsification. It may be put thus : If we shake a fixed oil with water, we break it up into a multitude of minute particles, so that the entire mixture has a milky appearance, but if allowed to stand the oil speedily separates. This is owing to two causes—the lower specific gravity of the oil and the want of adhesion between its particles and those of the water. The art of making emulsions consists in finding and introducing some body which will keep the particles of oil in the minutest possible size, and suspend them in the vehicle, so that when at rest the mixture shall not separate. The emulsifying media vary, as has been seen, but the principle of action is practically the same in every case. The object is to break up the substance to be emulsified into

minute particles, and to enclose each of them in a coating of the emulsifying agent. The following examples are instructive :—

Bals. copaib.	.	.	.	.	.	.	3vj.
Pulv. acaciæ	.	.	.	.	.	.	3iij.
Spt. æth. nit.	.	.	.	.	.	.	3ij.
Aquam	.	.	.	.	.	.	ad 3vj.

Make a thick mucilage with the gum and a little water, then add with constant trituration, alternately, first a little of the oleo-resin, then a little water, and so on till the whole of the copaiba is emulsified ; place in a bottle, add more water, and, lastly, the spt. æth. nit. By this procedure the copaiba is minutely divided, and each particle coated with mucilage. If the mucilage were added to the copaiba, or even the whole of the copaiba added at once to the mucilage, a different result would be effected. The copaiba would doubtless be broken up, but instead of being coated by, it would form the covering of, particles of mucilage, and on standing would quickly separate.

Ol. amygdal. dulc.	.	.	.	.	.	.	3iv.
Liq. potassæ	.	.	.	.	.	.	3j.
Vin. ipecac.	.	.	.	.	.	.	3j.
Aquam	.	.	.	.	.	.	ad 3iv.

Mix the liq. potassæ with 3 drachms of water, add the oil, shake until thoroughly emulsified, add more water, and the vin. ipecac. last.

Our next example is an examination prescription upon which a candidate failed:—

Ol. ricini	.	.	.	.	.	.	3iss.
Mucil. acac.	.	.	.	.	.	.	3j.
Syrup.	.	.	.	.	.	.	3ss.
Tr. zingib.	.	.	.	.	.	.	℥xv.
Aq.	.	.	.	.	.	.	ad 3iss.

Rub the oil down with 28 grains of pulv. acaciæ (which is the equivalent of 3j. of mucilage), and when that is thoroughly mixed add all at once 3j. of water, after which triturate until the whole is emulsified ; gradually add more water in small quantities ; lastly add the syrup and tinct. zingib., both

previously diluted with a little water. Made according to these directions a uniform preparation is produced which does not separate until kept for some time. The prescription is not a difficult one, but requires careful manipulation. In making emulsions it should be borne in mind that syrups, and preparations containing spirit, should invariably be added last.

The question as to whether emulsions of oils and oleo-resins should be made with mortar and pestle or in a bottle has been often discussed, and need not be entered on here, it now being almost universally agreed that the mortar and pestle are best, and a broad pestle should always be used.

EMULSIFICATION OF SPECIAL DRUGS.

Balsam of Peru may be emulsified with yolk of egg or with powdered acacia, as in the following :—

Potass. acet.	. . . . .	℥ss.
Acid. salicylic.	. . . . .	℥j.
Liq. morph. acet.	. . . . .	℥ij.
Balsam. peru.	. . . . .	℥ss.
Aquam		ad ℥viij.

Rub up the balsam with 4 drachms of powdered acacia, exactly as is done in the case of fixed oils, and use from 5 to 6 ounces of water for dilution. Separately rub together the acid and acetate with the morphine solution and the rest of the water. Mix the two.

Balsam of Tolu.—The following is an excellent emulsion :—

Dissolve—	Parts
Balsam of tolu	2
Rectified spirit	10
Tincture of quillaia	10
Water	78

See also previous remarks regarding the use of tincture of quillaia.

Benzoin (Tincture).—The simple tincture makes a good emulsion with a little mucilage, and the compound tincture may be emulsified with yolk of egg or mucilage, the yolk of egg giving a more stable emulsion.

Cod-liver Oil is frequently prescribed with syrups, *e.g.* :—

I.	II.
Ol. morrhuae . . . ʒj. Liq. potassæ . . . ʒss. Mucil. tragacanth. . . ʒss. Aq. chlorof. . . ad ʒij.	Iodi . . . gr. $\frac{1}{20}$ Syr. Eastoni . . . ℥x. Ol. jecor. aselli . . ad ʒj.
Fiat emulsio et adde—	Fiat mistura.
Syr. ferri phos. co. . . ʒj.	Mitte ʒvj.
M.	

As soon as the syrup is added to the emulsion of No. I. complete separation results ; it is, in fact, a mistake to attempt to emulsify such mixtures, because a brisk shake mixes a syrup and an oil sufficiently to enable a dose to be poured out. In the case of No. II. the iodine was dissolved in a little ether and added to the oil before the Easton's syrup. Cod-liver oil is not at all difficult to emulsify, but, like other things emulsified, it cannot bear being overloaded with acids. The following recipes (from 'Pharmaceutical Formulas') typify the methods followed in compounding the oil into emulsion :—

WITH ACACIA.

Cod-liver oil . . . ʒiv. Powdered gum acacia . ʒj. Saccharin elixir . . ʒss. Flavouring oils . . ℥viiij. Distilled water . . to ʒviiij.	Some prefer to make the gum into a mucilage with 2 ounces of water, and gradually add the oil to it, with trituration. It is a distinct advantage to use 1 ounce of lime-water in this formula ; it greatly assists emulsification—indeed, a good emulsion results from shaking together equal parts of oil and lime-water.
Mix the oils in a mortar with the gum, add 2 ounces of water and the elixir, and triturate briskly but lightly until an emulsion is formed ; then add the rest of the water in portions with diligent stirring.	

WITH EGG.

Cod-liver oil . . .	3vj.
The yolk of one egg.	
Powdered tragacanth . .	gr. x.
Elixir of saccharin . .	3ss.
Simple tincture of benzoin	℥XLV.
Spirit of chloroform . .	3ij.
Flavouring oils . .	℥xij.
Distilled water . .	to 3xij.

Measure 4 ounces of the distilled water, place the tragacanth in a dry mortar, and triturate with a little of the cod-liver oil; then add

the yolk of egg and stir briskly, adding water as the mixture thickens. When of a suitable consistence, add the remainder of the oil and water alternately, with constant stirring, avoiding frothing. Transfer to a pint bottle, add the elixir of saccharin, tincture of benzoin, spirit of chloroform, and oils, previously mixed; shake well, and add distilled water, if necessary, to make 12 ounces.

A tragacanth emulsion has already been given (page 316).

Copaiba.—The methods of emulsifying the ‘balsam’ have already been described (page 322, see also page 340). When mucilage and solution of potash are prescribed with it dispensers frequently bungle the emulsion, so that the following example may be noted :—

Copaibæ	3ij.
Mucilaginis acaciæ	3vj.
Liquoris potassæ	3j.
Aquam	ad 3iv.

M.

Mix in a mortar 45 grains of powdered acacia gum and copaiba. Separately mix the liq. potassæ with 7 drachms of water; of this add 70 minims to the mortar-contents and stir vigorously until the emulsion is quite smooth; then add the rest of the solution gradually, and make up.

Copaiba Resin.—Rub the resin with one-third its weight of sugar of milk, and about its own weight of pulv. acaciæ, and add the water gradually. Mr. Gerrard recommends the resin to be rubbed with twice its weight of compound powder of almonds until well incorporated, adding the water after the manner of forming an emulsion.

Chloroform is made into an excellent emulsion with tincture of quillaia, thus : Chloroform 3j., tincture 3ij., water to 3xx.

Ext. Filicis Maris.—For each drachm use 2 ounces of new milk. Resin soap or even powdered soap is excellent, *e.g.* :—

Ext. filicis maris	3j.
Pulv. saponis duri	gr. v.
Aq. menth. pip.	ad 3ij.

Rub the soap with the extract, and gradually add the water. The extract also emulsifies with half its weight of powdered acacia gum by the 'English method.'

Iodoform is made into an emulsion (for injection) either with starch mucilage or with pulv. trag. co. Use precipitated iodoform in impalpable powder. Examples :—

I.	
Iodoformi	3iss.
Amyli	gr. v.
Triturate well and pour on the powder with diligent stirring—	
Aq. bullient.	3ij.
M.	

II.	
Emulsio. iodoformi 10 p.c.	3iv.
M.D.U.	

In this case 40 grains of pulv. trag. co. made the 175 grains of iodoform into an excellent emulsion.

Petroleum is now commonly prescribed as an emulsion. The heavy oil (paraffinum liquidum) is intended, and the unbleached kind or the Russian water-white should be used, otherwise the emulsion will stink in a few days owing to the sulphur compounds in the bleached oil. Emulsify with acacia in the same manner as cod-liver oil. A correspondent of *The Chemist and Druggist* was called upon to compound an emulsion of ordinary paraffin oil. The following was his method :—

'Daylight' petroleum	3iiss.
Powdered acacia	3x.

Mix thoroughly, then add at once—

Distilled water	3ij.
---------------------------	------

Triturate well until thoroughly emulsified, and add—

Elixir of saccharin	3j.
Essence of bitter almonds.	3ij.
Distilled water	to 3xx.

Mix.

Spermaceti may be emulsified with yolk of egg after being very finely powdered with rectified spirit.

Terebene may be emulsified in the same way as turpentine. The following prescription is a fairly difficult one to compound:—

Terebeni	ʒj.
Spt. chloroform.	ʒij.
Tinct. tolitanae.	ʒij.
Syr. tolitani	ʒvj.
Aq. menth. pip.	ad ʒvj.

Make a mucilage with 4 drachms of acacia and 6 drachms of peppermint-water in a mortar; of this reserve 2 drachms; with the remainder in the mortar rub the terebene until emulsified, and dilute with 2 ounces of peppermint-water. Dilute the reserved 2 drachms of mucilage with peppermint-water; transfer to a bottle, and with this emulsify the tincture of tolu; to this add the terebene emulsion and finally the other ingredients.

Turpentine.—Yolk of egg emulsifies turpentine well. Triturate the yolk carefully in a mortar, add gradually twice its volume of water, and strain through muslin. Of this mixture transfer to a bottle a measure equal to, or slightly more than, the turpentine to be emulsified, shake, add the whole of the turpentine, shake until thoroughly emulsified, and dilute further if necessary. Forbes's method for the emulsification of essential oils, such as turpentine, consists in the addition of 20 grains of acacia to each ounce of oil contained in a dry bottle, diffusing by a slight shake, then adding $\frac{1}{2}$ ounce of water, and briskly agitating for a few seconds, when the emulsion is complete, and can be diluted by the further addition of water without separation of the oil.

SUPPLEMENTARY NOTES ON EMULSIONS.

EMULSIONS are so much employed on the Continent that the methods there pursued are well worth knowing. We here reproduce some hints from the late Dr. Hermann Hager, with editorial comments. This chapter has been found useful by those who have German prescriptions to dispense.

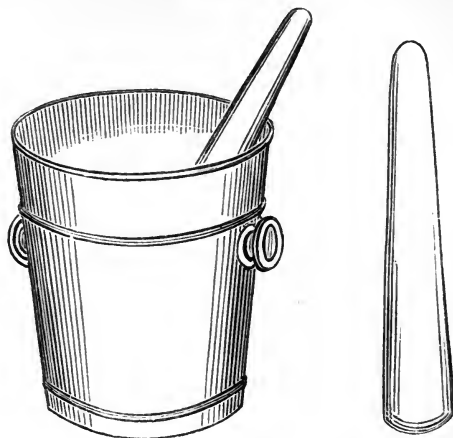
Emulsions are, according to Dr. Hager, milky-looking, thick fluids, of mucilaginous or gummy substances, or combinations of water with oily, fatty, or resinous bodies. They are classified as seed, oil, balsam, gum-resin, resin, wax, or spermaceti emulsions.

SEED EMULSIONS.

are made from seeds containing a fixed oil, such as almonds, poppy or hemp seeds, &c., by crushing these and rubbing them with water. If necessary, the seeds are first washed several times with water; when clean, they are beaten, with about one-tenth their weight of water, into a soft mass, which, when taken between the fingers, reveals no albuminous lumps. The remainder of the fluid is then added gradually, with continual rubbing, until the whole is evenly suspended. The emulsion should lastly be strained through a clean coarse cloth (millers' cloth).

The small proportion of oil contained in the seeds is suspended in the water by means of the albumen and mucilage of the seeds, but if the seeds are first rubbed down dry, the oil is expressed, and, though it is taken up in the emulsion, it more quickly separates, generally as a cream.

Almonds are always decorticated before being made into an emulsion, unless an order to the contrary is expressed.



Poppy-seeds should be softened before being beaten, by letting them rest for five to ten minutes in warm—not hot—water.



Highly polished brass mortars and marble mortars have been used for making emulsions, but within the last twenty years mortars have been made of a special kind of very hard porcelain, particularly for emulsions. The pestle is made of boxwood, and the forms of both pestle and mortar are shown in the above engraving. The height varies from 5 to 8 inches. The boxwood pestle allows a good force to be used in crushing seeds without danger of injury to the porcelain. [An ordinary Wedg-

wood mortar and pestle should be used for oil emulsions.

The second figure on page 330 shows such a mortar and the way in which the pestle should be used.—ED.]

Seed emulsions must not be made very hot, nor must hot fluids be added to them, else the albumen will be coagulated.

Lycopodium—a seed-like substance containing oil—may be made into an emulsion. After sifting to free it from coarse impurities, it is rubbed in a mortar with a little water until a damp crumbly mass is obtained. An addition of gum acacia is desirable to get a good emulsion. Then syrup or water is added gradually. If gum acacia be added, the prescription should be marked stating the quantity, 'Emulgendo admixtum.'

An oil, such as castor oil, is sometimes ordered with a seed emulsion, as in the following :—

	Grammes
Amygdal. dulc.	20
Olei ricini	30
Aq. fœniculi	100
Aq. destill.	100
Sodii nitrat.	15
Syrupi sacchari	25

M. Fiat emulsio.

This is really a double emulsion.

OIL AND BALSAM EMULSIONS.

Fixed oils, such as almond, poppy, olive, linseed, and castor, and balsams, such as copaiba and Peru, are easily combined with water by means of emulsifiers, of which gum acacia is the best. Yolk of egg and tragacanth are also emulsifiers. An emulsion with oil cannot be made satisfactorily with less gum acacia than one-fourth the weight of the oil. The proportion of water should be at least half of the total weight of the oil and gum.

The emulsifying power of 10 grammes of gum acacia is estimated as equal to the yolk of a large hen's egg, to 1·25 gramme of tragacanth, or 1 gramme of salep.

These emulsions may be made in either of three ways :

(1) By adding the water to the powdered gum in a large mixture-mortar, mixing with a large-knobbed pestle ; then adding the oil or balsam all at once, and stirring till emulsified, which will require two or three minutes. This is generally the surest plan [and the so-called 'Continental method.'—ED.]. Or (2) the gum may be put in the mortar, the oil poured on the top of it, the water round it, and then all the substances quickly stirred together. This is the method mostly adopted. Or (3) the oil may be rubbed with the gum, and the water added gradually. The proportions for a good emulsion are :—

	Parts
Oil or balsam	10
Gum acacia	5
Water to make the emulsion	7.5
Water to add to the emulsion	77.5

The first method of emulsification described is not quite so speedy, but it is very sure. Sometimes castor oil or balsam of copaiba cannot be emulsified by the second or third process. Probably this happens in consequence of some peculiarity in the oil or balsam, and the fact that in the two latter cases the gum is not dissolved quickly enough to effect the emulsification.

[The third plan is one which is now much followed in this country and recommended by leading pharmacists. Expertness is, however, required in order to have successful results. The probability is that moderately good results may be obtained by any one of the processes IF THE DISPENSER IS IN THE HABIT OF FOLLOWING IT. If he gets good results from any particular process, we should not advise any experiments in the way of changing it. An emulsion at the best is a ticklish affair, and we have generally found it better to let well alone.—ED.]

Salts, extracts, or other solid bodies to be dissolved in emulsions should be separately dissolved in some of the water to be added, and mixed with the emulsion. If mixed with the emulsifier a separation of some of the oil will occur.

Lycopodium, which is often ordered with oil emulsions, causes such a separation with remarkable rapidity. It is best

to emulsify the oil and the lycopodium separately, and to mix the two in diluted form.

Borax added to a gum-acacia emulsion converts the latter into a jelly. Diluted acetic acid restores the fluidity, but such an addition is by no means justifiable. If an emulsion with borax and gum be ordered in a prescription, the mixture must be sent out in a wide-mouthed bottle. The gelatinisation does not occur till several hours after the mixing.

Balsam of Peru to be combined with an oil emulsion should be mixed with two-thirds of its weight of water, and stirred in with the emulsion in a mortar.

[The better plan is to mix about $\frac{1}{2}$ part of 90-per-cent. alcohol with 1 part of glycerin, and to this add the balsam of Peru, then incorporate thoroughly. This may be diluted to a proper miscible point for an emulsion by the further addition of water, plain, or, better still, a mixture of glycerin and water gradually added.—ED.]

Emulsions with tragacanth do not keep well, and are but seldom ordered. For their preparation 1 gramme of tragacanth is mixed with 20 grammes of water. To this 20 grammes of oil and 10 grammes of water are added at once, and combined into an emulsion with constant stirring. The rest of the water is added gradually.

[The statement about the keeping properties of tragacanth emulsions is a mistake, as is testified by the sweetness of cod-liver-oil emulsions prepared with tragacanth. Tragacanth has properties as an emulsifying agent which in some respects are unequalled for such an oil as cod-liver-oil.—ED.]

If spirit of wine, concentrated acids, solutions of salts, or tannin substances are to be mixed with emulsions, they should always be added in as diluted a form as possible.

Emulsions of Gum Resins.—Gum resins, such as galbanum, ammoniacum, myrrh, asafetida, and scammony, contain gummy matter, as well as resin insoluble in water, so that the addition of an emulsifier is not absolutely required. It is generally only necessary to rub down the gum resin to as fine

a powder as possible, and emulsify with water. In warm weather this is not always practicable, as the gum resin is too soft. It is then best to put it into a mixture-mortar in small pieces, sprinkle it with water, and put the mortar with the pestle in a moderately warm place until the substance has become of the consistence of honey. To each gramme of the gum resin are added 1 drop of almond oil and 3 drops of mucilage of acacia, and then, by the gradual addition of warm water and vigorous working with the pestle, a good emulsion will be obtained.

Generally gum acacia or yolk of egg is ordered with a gum resin to emulsify it better. If either of these is used the gum resin should be in very fine powder. One part of gum acacia to 2 parts of gum resin, or one yolk of egg to 20 grammes of gum resin, is the usual proportion. If the gum resin cannot be powdered it is softened by warming, as explained, but with yolk of egg the temperature must not exceed 60° C.

Emulsions of Resins.—These are prepared from Venice turpentine, guaiacum resin, resin of jalap, and such-like substances.

Venice turpentine is easily emulsified by its own weight of gum acacia or by yolk of egg (two yolks to 20 grammes).

Resin of guaiacum is finely powdered and rubbed in a mortar with half its weight of gum acacia, water being added gradually. This emulsion assumes a bluish tint, varying in intensity according to the degree of concentration. The blue gradually changes to a green. A few drops of sweet spirit of nitre will develop the blue tint, as will also exposure to the air.

Resin of jalap is sometimes combined with almonds into an emulsion (four blanched sweet almonds to 1 gramme of resin), but it soon separates. If neither almonds nor egg be ordered, but only gum or sugar, it is generally best to rub the resin first with its own weight of spirit before mixing with water.

Quinoidine and some other amorphous alkaloids, tannate of quinine, oleo-resins of cina, male fern, and cubebs may be conveniently treated like resins. By rubbing them with three or four times their weight of sugar, and adding spirit of

wine to make a thin electuary, they mix well with water. Without the addition of spirit these substances are apt to form a sediment which is very difficult to mix evenly by shaking.

Emulsions of Essential Oils, such as oil of turpentine, do not last long. They are best formed by brisk shaking with a thick mucilage. They require about ten times their weight of gum acacia or one yolk of egg for 5 to 10 grammes of essential oil. [One yolk will emulsify more if the operation is carefully done.—ED.]

Camphor should be rubbed to a fine powder with the aid of a few drops of absolute alcohol, then mixed with ten times its weight of gum acacia or the yolk of an egg to 5 grammes (gum in preference), and the water added gradually. Any oil or balsam in the mixture should be mixed with the camphor before the gum is added. Syrup should be mixed up with the powder before the addition of water.

Phosphorus.—The preparation of this powerful medicine requires the greatest care. A mixture containing a few particles of phosphorus the size of a pin's head may easily occasion fatal gastritis. It is, therefore, most important that when it is ordered in a mixture it should be perfectly divided. Some pharmacists have recommended the solution of phosphorus in hot mucilage. It is liable, however, in cooling to form small particles like wax, which makes this method highly dangerous. It should be dissolved in 100 times its weight of almond or poppy oil in a test-tube by frequent dipping into hot water, and the oil solution emulsified in the proper way.

[The best plan to follow in such a case as this is to emulsify the proper quantity of the official ol. phosphorat. in the same manner as almond oil is emulsified with acacia. Fortunately, emulsions of this kind are seldom ordered in this country.—ED.]

Wax, Spermaceti, and Cocoa-butter are emulsified like the fixed oils. The wax is melted and poured into a hot

mortar, the pestle also being heated. To 10 grammes of wax an equal weight of gum is added, and 15 grammes of hot water is added gradually. After well mixing the mortar is partly cooled, and 85 grammes of cold water is stirred in gradually. Yellow wax should always be used for an emulsion. It gives a perfectly white emulsion. White wax cannot always be well emulsified, and the small proportion of tallow which it not infrequently contains is likely to impart to it a rancid taste.

[The rule may be safely laid down that fixed oils require the mortar and pestle, while volatile oils are better, as well as more quickly, emulsified by agitation.—Ed.]

HINTS BY THE LATE JOSEPH INCE.

Let the dispenser know when he has done his task, and when once he has formed his emulsion let him add rapidly the remaining ingredients. Many an emulsion is ruined by over-manipulation, and the oil having been incorporated is thrown out again by continuous stirring when mechanical mixture is concerned.

[The late Mr. William Gilmour, experimenting on the theory that by always stirring an emulsion in one direction the oil is broken up in volume, minute globules resulting, but when the direction of stirring is reversed the oil tends to return to its original state, found that, although a difference in the size of the globules was observable when examined by the microscope, little difference was apparent to the naked eye, and the two emulsions were, from a practical point of view, identical. It was noticed, however, that by stirring in two directions a little longer time was required to finish the emulsion, and this was the case with several oils when operated on with different emulsifying agents. On the whole, he considered that not much importance is to be attached to the theory of stirring one way, but it is advisable not to reverse the direction towards the end of the process, because at that point the tendency to spoil seems to be particularly marked.—Ed.]

When liquids, limpid or viscous, are to be compounded, the gentlest manipulation should be employed. Increase of pressure generates heat, and heat is fatal to union. Thus, when olive oil, mucilage, and water are to be emulsified, while care must be taken to have the three entirely under the control and action of the pestle, at the same time lightness of hand cannot be too carefully studied.

On the contrary, when a solid has to be broken down and worked into a pasty saponaceous mass, an exactly opposite mode of treatment must be adopted. The object is to produce a kind of soap, which can only be extemporaneously manufactured by strong, continued muscular action, with evolution of heat to complete the change.

Emulsions with Gum Acacia.—The slightest tendency of the mucilage to acidity will defeat the best manipulation. [The B.P. directs 100 grammes of gum acacia to be rinsed and dissolved in 150 millilitres of distilled water.—ED.] No heat should be used to facilitate solution, for small picked gum acacia stirred occasionally in cold distilled water until the gum is dissolved gives an excellent result. Powdered gum is a very foolish expedient for gaining time, and, when this mucilage is not bright without filtration, alteration of an injurious character may be anticipated. When finished, mucilage should be strained through muslin and kept in a cool place.

Ol. amygdal.	5iss.
Mucilag. gum. acac.	3ij.
Syrupi	5iss.
Aquam dest.	ad 3ij.

Put the whole of the mucilage into the mortar first; add the almond oil by degrees, but rapidly, with constant circular stirring in one direction, from left to right. Never add a second drop of oil until the first quantity has been emulsified. This is known by the creamy character of the product and its tendency to form clear spaces by leaving the sides of the mortar. Study two things—quickness of motion and lightness of hand. To the emulsion add the syrup and the water rapidly; of the

latter $\frac{1}{2}$ ounce at a time. Five minutes should be employed in the whole operation. Slow dispensing is bad dispensing.

Powdered gum acacia is frequently ordered, and its exclusive use has been advocated by some continental pharmacists.

Acaciæ pulv.	.	.	.	.	.	.	℥ij.
Ol. amygd.	.	.	.	.	.	.	℥ss.
Syrup. simpl.	.	.	.	.	.	.	℥ss.
Aquam destillat.	.	.	.	.	.	.	ad ℥j.

Misce.

Put the powdered gum into the mortar, and with a fair amount of force make it into a mucilage with $1\frac{1}{2}$ drachm of water. Proceed as in the last case, lightness of hand being essential when once the mucilage is made. Six minutes should complete the operation: an experienced dispenser will want less, but these remarks are written for beginners, and are not offered as advice to experienced pharmacists.

Gum-resin Emulsions.—The *mistura ferri composita* will exemplify the subject. It is infinitely preferable to prepare it for stock in a concentrated form of four times the strength, and to keep the ferrous sulphate apart until required.

Myrrhæ	.	.	.	.	.	.	℥ss.
Sacchari	.	.	.	.	.	.	℥ss.
Potass. carb.	.	.	.	.	.	.	gr. xv.
Spt. myrist.	.	.	.	.	.	.	℥ij.
Aquæ rosæ	.	.	.	.	.	.	℥ixss.
Ferri sulphat.	.	.	.	.	.	.	gr. xij.

Beat the myrrh well, divide the beaten mass with the powdered sugar, and make into an emulsion with half the rose-water. Next add the carbonate of potassium dissolved in the remainder of the water, and add the spirit last.

Recollect that potassium carbonate is a hostile ingredient in an emulsion when present with a second emulsifying agent. Proceeding in this way an excellent emulsion is produced in an extemporaneous manner; but there is a better mode.

Beat the myrrh as usual, divide with sugar, add the potash, and make a thick creamy emulsion with just sufficient water.

Let this stand, covered from the air, overnight, and the following morning finish the operation. A few minutes' trituration will restore the whiteness, and such a *mistura ferri* will keep for some years without alteration. [NOTE.—Since Mr. Ince made these remarks the B.P. formula has been altered in quantities, and his 'better mode' has been adopted in principle.]

Ammoniacum and *asafetida* must both be converted into hydrated masses. Let them, before being manipulated, soak in a small quantity of water, when they are readily reduced to a pulpy condition, and form tolerable emulsions afterwards without any additional emulsifying agent.

Egg Emulsions require a skilful hand, and may be presented as permanent combinations. The first and last requisite is that the dispenser should abstain from the slightest mechanical force. Example:—

<i>Ol. ricini</i>	.	.	.	.	.	.	.	3j.
<i>Vitellum ovi</i>	.	.	.	.	.	.	.	j.
<i>Syrup. simpl.</i>	.	.	.	.	.	.	.	3ij.
<i>Tinct. aurant.</i>	.	.	.	.	.	.	.	5j.
<i>Aquam</i>	.	.	.	.	.	.	.	ad 3iij.

Break the egg-shell cleverly on the side-edge of a 2-ounce measure, into which let the albumen run. Entirely clear away the albumen (a fertile source of failure when this precaution is neglected). Keep the albumen to be used as liquid gum, and also for sugar-coating pills. Render the yolk (thrown into the mortar) perfectly smooth under the pestle with rapid circular motion; add the oil by degrees; if occasionally too thick, thin with a little water. Add the syrup next; then wash out the measure with a little water. Add the tincture last, and finally wash out the measure with the remaining water, and the process is complete.

Yolk of egg is supreme with regard to *spermaceti*, once a very favourite remedy with the *accoucheur*.

<i>Cetacei</i>	.	.	.	.	.	.	.	3ij.
<i>Vitellum ovi</i>	.	.	.	.	.	.	.	j.
<i>Syrup. simpl.</i>	.	.	.	.	.	.	.	5iv.
<i>Aquam</i>	.	.	.	.	.	.	.	ad 3iij.

Break down the spermaceti; make it quite smooth in the syrup, then proceed as usual. All these egg emulsions keep. When a dilute acid forms an ingredient in an emulsion, it should be added last, and there should be no fear of imperfect combination.

Copaiba Emulsions.—The practice has been recommended of making certain emulsions by very carefully smearing the bottle with the emulsifying agent. But it has been generally condemned, as not being an effectual method. Copaiba forms an exception, and the balsam may be as well emulsified in this way as by any other.

Copaibæ	3vj.
Liq. potassæ	3iij.
Mucilag. acaciæ	3j.
Spt. æther. nitr.	3iij.
Aq. cinnamom.	ad 3viiij.

Rotate the mucilage in the bottle, well covering the inside. Add the copaiba by degrees; perfectly emulsify by adding the alkali, previously diluted with 3 drachms of cinnamon-water; then add the rest of the cinnamon-water by degrees, retaining or allowing for 2 ounces with which to cleanse the measure from both the liquor potassæ and the spirit of nitrous ether, which should be added last.

Some prescribers are particular in the exhibition of copaiba, and occasionally want it to be taken without other ingredients. It can be so prepared, or made to combine at pleasure in all strengths by using freshly made thick mucilage; thus:—

Pulv. gum. acaciæ	3j.
Aquæ destill.	3j.

Misce, et adde—

Copaibæ	3iij.
Aquæ destill.	q.s. ad 3iv.

Extractum filicis liquidum and tinctura cannabis indicæ may both be compounded in the same manner.

NOTES.

Glycerin, like an alkaline salt, is a disturbing agent in an emulsion when another emulsifier is present. Many salts spoil emulsions when they are either neutral or acid, but when alkaline they favour the process. Borax has a beneficial action in the absence of acacia, and is in itself an excellent emulsifying agent.

Professor Redwood used to say that mucilage answers better than an alkali for making an emulsion with castor oil or copaiba, but that the alkali is best for oil of almonds. Moreover, a good emulsion of oil of almonds and alkali is spoiled by the addition of mucilage. This the late Mr. Ince confirmed from constant disappointment.

M. Constantin (in 1854) advocated what may be called the ignition process for emulsion of the gum resins and resins. He took a weighed quantity of gum resin, and, having placed it in a mortar, added about four times its weight of alcohol. The spirit being ignited, the whole was triturated until all the alcohol was burned away. The gum resin became a soft extract; the liquid was then added in small quantities at a time, and a perfectly homogeneous emulsion was produced without subsequent separation. In the case of resins they must be converted into gum resins by the addition of powdered gum arabic. To the resin—balsam of tolu, for instance—twice its weight of gum arabic is to be added, and alcohol used in the same way. The peculiar taste and odour remain undiminished. The method is expensive, but quite successful.

With the softer resins and gum resins trituration in a hot mortar gives pretty much the same result as regards facilitating procedure in emulsification, and there is less risk of any of the volatile constituents being dissipated. See procedure of analogous kind in mixture of Indian hemp extract and chalk mixture on page 311.

APPLICATIONS.

THIS chapter includes difficulties arising in compounding prescriptions for liquid topical applications and articles which are not administered *per os*—*e.g.*, lotions, liniments, and injections.

In regard to dispensing such preparations it may be recalled that the Poison Regulations (Pharmacy Act, 1868) require embrocations, liniments, lotions, and liquid disinfectants containing scheduled poisons to be sent out in bottles distinguishable by touch (see page 18). There is a large choice of 'poison-bottles,' and it should be the invariable rule to dispense liquid medicines which are not to be taken internally in bottles distinct in shape or colour, no matter how innoxious the preparations may be. Gargles are an exception to the rule; they are dispensed in a 'mixture-bottle'; but if, as sometimes happens, a mixture is prescribed along with a gargle, the bottles in which they are severally dispensed should be different in shape.

It is advisable not to label as 'Poison' external medicines which are not poisonous. 'For external use' and 'Not to be taken' labels should be used where appropriate. Compare the remarks on pages 12 to 17.

LOTIONS.

'The Lotion' generally is the external analogue of 'The Mixture.' Its functions are varied, but the introduction of the antiseptic system of surgery has somewhat narrowed the composition of this class of preparations. Handsel Griffiths says lotions are 'external applications or washes, generally consisting of simple solutions of medicinal substances, and usually applied by wetting a piece of linen'—not a precise definition, but it will suffice. Such simple solutions are exemplified by

the following medicaments, the quantities appended being the proportions to each ounce of water which are usually prescribed :—

Acidum boricum . . .	gr. x.—gr. xx.	Liq. calcis chlorinat.	℥ss.
Acidum carbolicum.	gr. x.—gr. xx.	Liq. carb. deterg. .	℥xx.
Acid. hydrocyanicum		Liq. plumbi subacet.	
dilutum . . .	℥v.	fort.	℥x.
Acid. picric. . . .	gr. ij.	Liq. sodæ chlorinat.	℥ss.
Acid. sulphurosum .	℥j.	Plumbi acetat . . .	gr. iij.—gr. v.
Acidum tannicum . .	gr. viij.	Potassa sulphurata .	gr. x.
Alumen	gr. v.	Potassii permangan.	gr. $\frac{1}{8}$ —gr. j.
Argenti nitras . . .	gr. ij.	Sanitas	℥x.—℥xx.
Borax	gr. x.	Sodii carbonas . . .	gr. x.
Creolin	℥v.—℥x.	Sodii hyposulphis .	℥ss.
Cupri sulphas . . .	gr. iij.	Zinci chloridum . .	gr. ij.
Ext. belladonnæ . .	gr. ij.	Zinci sulphas . . .	gr. iij.—gr. v.
Hydrarg. perchlor. .	gr. $\frac{1}{4}$	Zinci sulphocarb. .	gr. v.

When a lotion of any of these is prescribed and no strength is mentioned, the proportions in this table may be followed.

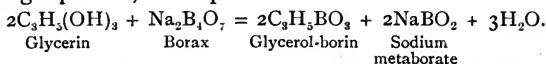
It is particularly important that solutions such as the foregoing should be dispensed perfectly free from sediment. Dispensers are sometimes tempted to use tap-water for lotions because 'it does not matter.' If any reaction takes place between the dissolved solids in the water and the medicaments, whereby a deposit forms, the lotion may, on application to a tender surface, cause considerable irritation. Some lead lotions are purposely opalescent, as there is a long-standing notion that the fine lead precipitate is a protective. Subjoined is a selection of prescriptions which illustrate difficulties frequently encountered by dispensers.

Borax.—This salt (sodium pyroborate, $\text{Na}_2\text{B}_4\text{O}_7, 10\text{H}_2\text{O}$) is alkaline in reaction, and behaves as an alkali when added to aqueous solutions of alkaloidal salts, but the addition of a few drops of glycerin prevents precipitation. It does not behave as such, however, when an alkaline carbonate is added to an aqueous solution of borax, but solutions of borax in glycerin or honey effervesce when a carbonate is added. For example, the following lotion, typical of many which could

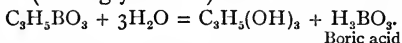
be reproduced, burst the bottle a short time after it was dispensed, owing to evolution of carbonic-acid gas :—

Sodii biboratis	℥ss.
Sodii bicarbonatis	℥ss.
Glycerini	℥j.
Acidi carbolici liquefacti	℥ij.
Aquam rosæ	ad ℥vj.

The change is due to interaction between the borax and glycerin. When borax and glycerin are heated together in molecular proportions, a decomposition, represented by the following equation, takes place :—



Glycerol-borin ('boroglyceride') and water interact thus :—



Therefore, if the water resulting from the first reaction is not driven off by heat, the resulting glycerin (as in the case of glycerin. boracis, B.P.) contains free boric acid, and when a bicarbonate is added effervescence immediately ensues. The two reactions also take place in the lotion above mentioned, and in all similar lotions containing glycerin, borax, sodium bicarbonate, and water. The reaction is one common to polyhydric alcohols, of which glycerin, dextrose (in honey), and mannite (in manna) are the most familiar representatives ; consequently, if any of these occur along with borax and a carbonate, effervescence is inevitable and should be completed by heating before the solutions are dispensed. The *modus operandi* for the prescription quoted is : Mix the borax with the glycerin and 2 ounces of rose-water, heat, and add the bicarbonate, stirring until effervescence ceases. When cold add the carbolie acid dissolved in the rest of the water, and make up.

The following are additional peculiarities :—

I.	II.
Acidi salicylici	Sodii biboratis
Sodii biboratis	Aluminis
Glycerini	Glycerini
Aquam	Aquam rosæ
ad ℥viij.	ad ℥viij.

Without the glycerin No. I. is a clear solution, with it a precipi-

tate of boric acid is obtained. On heating the mixture the acid dissolves (in the glycerin, doubtless) and is not reprecipitated on cooling. No. II. yields a precipitate of aluminium borate ($3\text{Al}_2\text{O}_3 \cdot 2\text{B}_2\text{O}_3$) with alkaline sulphate. Zinc sulphate gr. viij. and borax gr. x. in an ounce of water give a white precipitate, but not if a few drops of glycerin is added.

Glycerin. acid. carbolic.	. . . . .	ʒj.
Glycerin. acid. tannic.	. . . . .	ʒj.
Aluminis . . . . .	. . . . .	gr. xx.
Aq. chloroform.	. . . . .	ad ʒvj.

A tablespoonful to be mixed with a cupful of warm water for use as a spray for the throat.

On diluting this with hard water a light voluminous precipitate of aluminium tannate, induced by lime salts, is formed, but not so when distilled or soft water is used.

Boroglyceride when treated with water decomposes into boric acid and glycerin, and if sufficient solvent is not present, boric acid is precipitated (see p. 344).

Hydrargyri Perchloridum.—This salt, as may have been noticed from many of the difficulties previously exemplified, is one of the most active chemical reagents, and as it is now extensively employed as an antiseptic, dispensers must bring all their chemical knowledge to bear upon it when compounding it.

I.		II.	
Hydrarg. perchlor.	. . ʒj.	Hydrarg. perchlor.	. . gr. xij.
Spt. methylati . . .	ʒiij.	Spt. ammon. arom.	. ʒj.
Tr. iodi decoloratæ . .	ʒiij.	Aq. aurantii flor.	. ʒvj.
Fiat injectio.		Fiat lotio.	

With tr. iodi decol., B.P.C., a few months old No. I. gives a clear mixture. Sometimes there is a white precipitate. No. II. is for application to the scalp, the fine precipitate of ammoniated mercury being desired.

Cocaine and its Salts are now so commonly used for producing local anæsthesia that prescribers sometimes add a cocaine salt as an adjunct to caustic or irritating substances whose specific action on the skin or mucous membrane they

desire. In consequence incompatibility results frequently. The following are examples :—

I. THE ALKALOID ALONE.

Cocainæ	gr. x.
Plumbi acetatis	℥ss.
Aq. rosæ	ad ℥x.

Fiat collyrium.

Probably the prescriber knew that if he used cocaine hydrochloride there would be a precipitate of lead chloride. The plan with above is to dissolve the cocaine (diffused in a drachm of water) in a sufficiency of acetic acid carefully added.

II. WITH BORAX.

Sodii biboratis	gr. vj.
Cocainæ hydrochlor. . . .	gr. iij.
Aquæ rosæ	℥ss.
Aquæ dest. . . .	℥ss.

Fiant guttæ pro oculis.

Many more prescriptions with the same incompatibility might be given. They are common. The borax precipitates cocaine hydrate, which rapidly crystallises. Dissolve the borax in the rose-water, and add boric acid until the reaction is distinctly acid, then mix with a solution of the cocaine salt.

III. WITH CARBOLIC ACID.

Cocain. hydroch. . . .	gr. x.
Glycer. acid. carbol. . . .	℥ij.
Aquam	ad ℥ij.

On dissolving the cocaine hydrochloride in 1 ounce of water, the glycerin in 6 drachms, and adding the latter to the former, a precipitate was produced. Spring-water was used, but a clear solution was obtained with distilled water. Carbolic acid gives

a milky mixture with solution of cocaine hydrochloride in distilled water, but no apparent precipitate.

IV. WITH MERCURIC CHLORIDE.

Hydrargyri perchlorid. . . .	gr. j.
Cocainæ hydrochlorid. . . .	gr. iij.
Glycerini	℥ss.
Aquam	ad ℥ij.

Fiant guttæ.

A white precipitate is formed consisting of chloro-hydrargyrate of cocaine. This is one of the B.P. tests for cocaine. The precipitate cannot be avoided.

V. WITH SILVER NITRATE.

Cocainæ hydrochloridi	gr. xx.
Argenti nitratis	gr. x.
Aq. dest. . . .	ad ℥j.

M. 'The paint for the throat.'

Silver chloride is precipitated. To avoid it, dissolve 21 grains of cocaine hydrochloride in 2 ounces of water, add, with constant stirring, ammonia solution to faint alkalinity, collect the precipitate on a paper filter, wash with 1 ounce of water, transfer the moist precipitate to a glass mortar, and dissolve with dilute nitric acid added drop by drop. Then proceed *sec. art.*

VI. WITH ZINC CHLORIDE.

Zinci chloridi	℥ss.
Cocainæ hydrochlor. . . .	gr. x.
Glycerini	℥ss.
Aq. . . .	ad ℥j.

Fiat pigmentum.

This gives a white precipitate of cocaine hydrate, apparently owing to dissociation of zinc chloride,

although the solution is neutral. A clear solution is obtained by dissolving the zinc chloride in water, clearing the solution with dilute hydrochloric acid, adding the glycerin, mixing well, then adding the cocaine salt dissolved in the rest of the water.

VII. A FRENCH PRESCRIPTION.

Acide phenique . . .	1.00 gram.
Iode puris . . .	0.20 „
Iodure potassium . . .	0.40 „
Chlorhydr. cocaine . . .	0.10 „
Glycerin puris . . .	40.00 „

Paint for the throat.

Some difficulty was experienced in getting a clear solution. The following procedure produced the best result:—Dissolve the phenol in the glycerin; let the iodine and iodide stand with 0.6 gramme of water till solution is complete, then mix with the phenol and glycerin; place the cocaine hydrochloride in a mortar, and triturate thoroughly with a little of the mixed solutions, then gradually add the remainder, continuing the trituration steadily while the addition is proceeding.

Iodum.—The following are examples of another form of application:—

MANDL'S PAINT.

Iodi	gr. vj.
Potass. iodid.	℥j.
Ol. menth. pip.	℥vj.
Glycerin.	℥j.

'STAINLESS' IODINE.

Iodi	℥ij.
Acid. oleic.	℥iij.
Liq. ammon. (880)	℥xv.
Alcohol (90 p. c.)	℥XL.
Paraffin. liq.	ad ℥j.

In making the paint resist any temptation to add the oil before the iodine and iodide are dissolved in the glycerin. To compound the second prescription triturate the iodine with the oleic acid until dissolved, then add the paraffin, and lastly the alcohol and ammonia, previously mixed.

Liquor Carbonis Detergens.—The following are instances of the advantage of studying order of mixing:—

A.

Liq. carbonis detergent. . .	℥j.
Spiritus tenuioris . . .	℥ij.
Glycerini	℥iss.

B.

Liquor. carbon. deterg. . .	℥j.
Hyd. ammon. chlor. . .	gr. x.
Lanolin.	℥j.

When A is mixed in the above order (or any other in which proof spirit *per se* is used), the lotion is milky; but take rectified spirit 3x., add it to the liquor, then the glycerin, and lastly add water 3vj., and a clear lotion is obtained. In the case of B, place the ammoniated mercury in a mortar with about 15 grains of powdered tragacanth, add enough of

the liquor to wet them well, rub smooth, add the lanoline (using anhydrous), and triturate till well mixed; then add gradually, with continued trituration, the remainder of the liquor. Some of the spirit of the liquor will meantime have been driven off. To replace this and swell the tragacanth add about 20 minims of water, which has also the effect of whitening the ointment.—Result: excellent.

Liquor Hydrogenii Peroxidi gives a white precipitate of calcium peroxide when dispensed with lime-water.

Liquor Plumbi Subacetatis.—This commonly prescribed preparation may give curious results. Dispensers who find prescribers careless in regard to the suffixes 'dilutus' and 'fortis' must observe from the amount indicated or the directions which is intended. For 'lotio plumbi' the liq. plumbi subacet. dil. is dispensed. The following are a few typical difficulties:—

I. WITH ALBUMEN.

Liq. plumbi subacet. ℥ij.
Tr. opii ℥iiss.
Albumen ovi unius.
Aquam ad ℥viiij.

It is impossible to make this without a flocculent precipitate of lead albumen. Tincture of opium alone gives a precipitate of lead meconate with the liquor.

II. WITH COCAINE HYDRO-CHLORIDE.

Liq. plumbi subacet. ℥xx.
Liq. bism. et ammon. cit. ℥ss.
Cocainæ hydrochlor. ℥j.
Aq. flor. sambuci ad ℥iv.

Lead chloride is formed, but a clear solution is obtained by dissolving the cocaine salt in 1 ounce of water, adding to it the bismuth solution mixed with 2 ounces of water, then adding the liq. plumbi drop

by drop, stirring all the time, and making up. The ammonium citrate keeps the lead chloride in solution.

III. WITH ESSENTIAL OIL.

Liq. plumbi subacet. dil. ℥ij.
Lotio. nigræ ℥ij.
Gly. acid. carbol. ℥iij.
Spt. menthæ pip. ℥ij.
Fiat lotio.

Mix the first two, then add the glycerin, again mix; now stir well, and add, drop by drop, the spirit of peppermint. Do not stop stirring until all the spirit is worked in, otherwise the metallic precipitate becomes sticky.

IV. WITH FIXED OIL.

Acid. carbol. ℥xxv.
Ol. eucalypti ℥v.
Ol. amygdalæ ℥iiss.
Lotio. plumbi ad ℥ij.
Fiat lotio.

The presentable lotion desired was made by heating the almond oil with water 1 drachm and potassium carbonate gr. x. on a water-bath for half an hour, cooling, and adding gradually, with shaking, the eucalyptus oil, carbolic acid, and the rest of the water, leaving room for liq. plumbi and S.V.R. 10 minims each.

V. WITH TR. BENZ. CO.

Liq. plumbi subacet.	. . .	℥ij.
Tr. benzoin. co.	. . .	℥ij.
Aquæ	. . .	℥ij.

Impossible to mix these without

a vehicle. Ol. olivæ ℥j. suffices. Add it to the tincture, then add the liquor very gradually, shaking all the time, and finally the water in the same way.

VI. WITH TR. BENZ. CO. AND OL. TEREB.

Liq. plumbi subacet.	. . .	℥j.
Tr. benzoin. co.	. . .	℥j.
Ol. terebinth.	. . .	℥j.

Mix the oil and the tincture, then add the liquor gradually with shaking. There is no real difficulty in compounding this, strange to say.

It is not difficult to surmise from some of the foregoing that liq. plumbi subacet. plays the part of a saponifier if it has the chance. Dispensers will also note that 'liq. plumbi subacet.' represents the strong solution.

Menthol.—Some prescribers appear to imagine that menthol is soluble in water, perhaps because the crystals look salt-like. Never hesitate to filter watery solutions containing in suspension particles of menthol or thymol if they are to be used as gargles, and if the prescriber cannot be got at to alter the prescription. This, of course, does not apply to inhalations. The use of camphor with menthol in a preparation such as the foregoing obtains a larger quantity of the menthol in solution. The two substances should be rubbed together first. If camphor-water had been ordered instead of plain water, the procedure would have been to rub the camphor equivalent to the camphor-water with the menthol, then add the glycerin, and lastly the alum and chlorate dissolved in the requisite water.

Pix Liquida.—When prescribed with alkali (*e.g.*, liquor potassæ) and water, boil all together for half an hour, replacing water evaporated, cool, and strain.

Resorcin.—Any opportunity should be taken of calling the attention of prescribers to the fact that resorcin solutions

colour the hair. A lotion containing mercuric chloride, ammonium chloride, resorcin, eau de Cologne, and water changed silver-white hair into a reddish-yellow colour. On trying to bleach the dyed hair with hydrogen peroxide it became green !

Sodii Hyposulphitis.—This salt is easily decomposed; for example, the following lotion contains precipitated sulphur and has the odour of sulphuretted hydrogen :—

Sodii hyposulphitis	3vj.
Acidi sulphurosi	3ss.
Glycerini	3ij.
Aquam	ad 3viii.

The decomposition is probably intentional on the part of the prescriber.

Sulphur Præcipitatum.—No attempt should be made to mix this in the bottle. Put it in a mortar and triturate with any glycerin or spirituous ingredient which may be in the prescription before adding the water. Let the trituration be thorough, so as to increase the diffusibility of the sulphur.

Sulphurated Alkalies are frequently used in lotions for parasitic skin-diseases. The object is to form on the epidermis a deposit of sulphur. The sulphurated solutions should be perfectly fresh and clear. The most commonly used preparation is *Liquor calcis sulphuratæ*.

EYE-LOTIONS.

Eye-lotions are usually weak solutions in water of one or more medicaments of an antiseptic, astringent, or sedative character—such as boric acid, mercuric chloride, alum, tannic acid, borax, or sodium bicarbonate. The medicament may itself possess strongly preservative properties. In the very dilute solution, however, in which it is used in ophthalmic practice, the quantity present may be insufficient to preserve the lotion for more than a few days. Eye-drops consist usually of a solution of an alkaloid or other material which of itself possesses no preservative property, but on the other hand probably lends itself to the action of micro-organisms.

In compounding all prescriptions for such lotions and drops it is well to adopt a general procedure of sterilisation. Use recently boiled distilled water, have the bottle and cork soaking in hot water while the prescription is being prepared, and strain through wool that has been washed with a little of the sterile water. A solution of atropine sulphate in water so prepared keeps good for quite a long time. Prescribers recognise the probability of a preservative being required, but not being quite sure how to order it, and not having the time to spare to look up the matter, they not infrequently write a prescription such as this :—

Atropin. sulph.	.	.	.	.	.	.	gr. j.
Acid. boric.	.	.	.	.	.	.	q.s.
Aq.	.	.	.	.	.	.	℥ss.

In such case the conventional quantity of boric acid to use is 2 per cent. Salicylic acid has not been favourably received for preserving eye-drops, although a very small quantity is required—about $\frac{1}{8}$ grain to the ounce. A minim of sulphurous acid in 2 ounces of sterilised water prevents eserine (physostigmine) solutions becoming red.

The following is a typical eye-lotion of the old class ; commonly called ' red lotion ' :—

Zinci sulph.	.	.	.	.	.	.	gr. viij.
Tinct. lavand. co.	.	.	.	.	.	.	℥ij.
Spt. rosmarini	.	.	.	.	.	.	℥ij.
Aquam	.	.	.	.	.	.	ad ℥viij.

Ft. lotio pro oculis.

Pour the tincture and spirit into the bottle containing 7 ounces of distilled water ; dissolve the sulphate of zinc in $\frac{1}{2}$ ounce of water and add to the contents of the bottle. In this way there is comparatively little deposit. If spring-water of ordinary hardness be used, there will be a copious deposit of carbonate of zinc and sulphate of lime.

It is generally considered that lead lotions are bad for the eyes because the lead salt is apt to produce pigmentation of

the cornea, and thus cause temporary blindness. The following is an example of intentional incompatibility :—

Plumbi diacet.	. . . . .	gr. iij.
Zinci sulph.	. . . . .	gr. iij.
Spt. vini rect.	. . . . .	℥xx.
Aq. dest.	. . . . .	ad ℥iss.

Ft. collyrium.

On compounding this a precipitate of sulphate of lead is formed. It should be filtered when required for the eyes. Unfiltered lotions similar to this are used for old wounds.

The following are the strengths of eye-lotions commonly adopted, the quantities given being for 1 ounce of distilled water or finished lotion unless otherwise stated. Those marked with an asterisk are used for dropping into the eyes, the rest for bathing them :—

Acidi boric . . .	gr. v. to gr. x.	Cupri sulphatis . .	gr. j. to gr. ij.
Acidi boric. c. ext.		Hydrarg. perchloridi	1 in 5,000 to 8,000
belladon. . .	gr. j.	*Physostigmin. sulph.	gr. ij.
Acidi tannici . .	gr. x. to ℥ss.	Plumbi subacet. liq.	
Aluminis . . .	gr. iv.	et S.V.R. aa. . .	℥xx. to ℥xx.
*Argenti nitratis .	gr. ss. to gr. x.	Zinci chloridi . .	gr. ss. to gr. ij.
*Atropinæ sulphat.	gr. iv.	Zinci sulphatis . .	gr. j. to gr. iv.
Boracis . . .	gr. x.	„ „ et vin. opii	℥v.
*Cocainæ hydrochlor.	2 to 10 p.c.		

INJECTIONS.

Vaginal and Urethral Injections do not differ greatly from lotions, except that they are sometimes weaker in active ingredient, owing to larger quantities being used in irrigating. The following are the amounts of the more common medicaments used in this way for each ounce of distilled water :—

Acidum boricum .	gr. v. to gr. x.	Plumbi acetas . .	gr. ij. to gr. v.
Acid. tannic. and		Plumbi acet. with	
alumen . . .	gr. v. of each	ext. opii liq. . .	℥ij.
Alumen . . .	gr. j. to gr. v.	Potassii perman-	
Alumen gr. iij. and		ganas . . .	gr. ss. to gr. j.
zinci sulphas .	gr. ij.	Zinci chloridum .	gr. ss. to gr. j.
Argenti nitras .	gr. ss. to gr. ij.	Zinci sulphas . .	gr. j. to gr. iv.
Cupri sulphas . .	gr. j. to gr. ij.	Zinci sulphocar-	
Hydrarg. perchlor.	gr. $\frac{1}{4}$ to gr. ss.	bolas . . .	gr. ij. to gr. v.

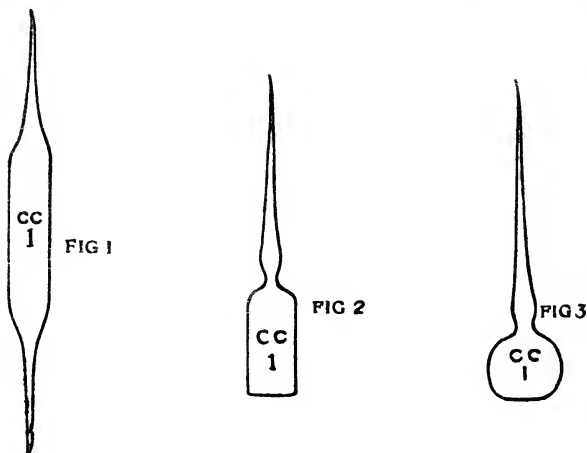
Hypodermic Injections are in most cases plain solutions of alkaloidal or other salts in distilled water, and the principal point to observe in preparing them is that all the utensils used should be sterilised by thorough washing and drying in an oven at a temperature of 220° F. The distilled water must also be recently sterilised by boiling. If these precautions are taken, and the bottles to contain the finished solutions are also sterilised, the solutions keep for a long time, if excluded from the air. Camphor, saccharin, salicylic acid, and chloroform are amongst the best non-irritant preservatives of hypodermic injections—salicylic acid being the best of all, in the proportion of $\frac{1}{2}$ grain to the ounce. Boric acid is useless. The practice is growing amongst medical men of having the active ingredients for hypodermic injections in the shape of lamels, tabloids, tabellæ, and other compressed or dry forms, as they keep indefinitely, and an injection may be prepared from one of them placed in the barrel of the syringe. Experience has pointed to the conclusion that when sores have resulted from hypodermic injections, these have been occasioned by some micro-organisms in the solution. Glycerin, if it form an ingredient in the injection, should be the purest procurable. Clear solutions may often require filtration, but it is important that the filters should be thoroughly cleansed by passing a quantity of distilled water through them. We subjoin the hypodermic doses most frequently prescribed :—

Acid. carbolic. . .	gr. $\frac{1}{4}$ to gr. j.	Ergotinina . . .	gr. $\frac{1}{300}$ to gr. $\frac{1}{100}$
Acid. sclerotic. . .	gr. $\frac{1}{4}$ to gr. j.	Homatropine salts	gr. $\frac{1}{120}$ to gr. $\frac{1}{20}$
Apomorphinæ hyd. .	gr. $\frac{1}{20}$ to gr. $\frac{1}{10}$	Hyoscinae hydrobr.	gr. $\frac{1}{250}$ to gr. $\frac{1}{120}$
Arsenii iodidum . .	gr. $\frac{1}{100}$	Hyoscyaminæ sul-	
Atropinæ sulphas .	gr. $\frac{1}{120}$ to gr. $\frac{1}{60}$	phas . . .	gr. $\frac{1}{120}$
Caffeina . . .	gr. $\frac{1}{3}$ to gr. ij.	Morphinæ tartras	
	with as much	gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$ et	
	sodium sali-	atropinæ sulphas	gr. $\frac{1}{192}$ to gr. $\frac{1}{96}$
	cy late or ben-	Nitroglycerinum .	gr. $\frac{1}{240}$ to gr. $\frac{1}{60}$
	zoate	Physostig. salicyl. .	gr. $\frac{1}{20}$
Cantharidinum . .	gr. $\frac{1}{800}$ to gr. $\frac{1}{300}$	Pilocarpinæ nitras .	gr. $\frac{1}{4}$
Cocainæ hydroch. .	gr. $\frac{1}{4}$ to gr. $\frac{1}{2}$	Quinine salts (see	
Codeinæ phosphas .	gr. $\frac{1}{8}$ to gr. $\frac{1}{2}$	p. 70) . . .	gr. ss. to gr. ij.
Curare . . .	gr. $\frac{1}{12}$ to gr. $\frac{1}{2}$	Strychnine salts .	gr. $\frac{1}{50}$ to gr. $\frac{1}{25}$

Dispensers will note that there are official (B.P.) formulæ for apomorphine, cocaine, ergotin, and morphine hypodermic injections. Sterilised water is used in each case.

AMPOULES.

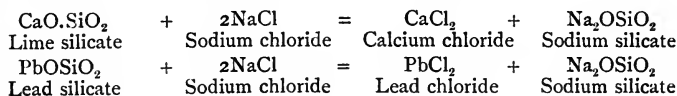
Ampoules are small glass vessels which can be hermetically sealed, and are used for storing sterilised solutions for hypodermic injection. They were first used as flasks by Pasteur, in the course of his researches on bacteria, for absolutely sterile media and to preserve the cultures from contamination by extraneous organisms. Thirty years ago M. Limousin, a Paris pharmacien, introduced the ampoule as a convenient



method of preserving hypodermic solutions. The use of ampoules is now general. Either white or coloured glass may be employed for ampoules, amber glass being very convenient for those substances affected by light. The empty ampoules are readily obtainable. The shapes vary greatly. Fig. 1, which is simply a tube drawn out to a point at each end, is largely used, but the phial-shapes (figs. 2 and 3) have much to recommend them. They can be stood upright, and have not the tendency to roll which those of tube-shape have. In fig. 2

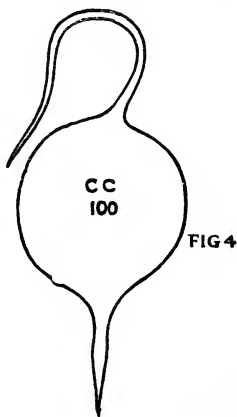
the constriction is found to facilitate breaking off the tip, and on this account it is sometimes preferred by physicians. Ampoules are made of 1 c.c. capacity for hypodermic solutions ; but larger sizes, such as 2 c.c., 3 c.c., 4 c.c., 5 c.c., and 10 c.c., are also obtainable. For such liquids as saline solution the shape exhibited in fig. 4 is employed. The series in this shape comprises ampoules of 20 c.c., 50 c.c., 100 c.c., 250 c.c., and 500 c.c. capacity.

Ampoules must be made of neutral glass—*i.e.*, one which does not yield alkali to or cause a turbidity in solution kept in it. The following equations show the reaction that occurs when saline solution is boiled in lime or lead glass :



To test for alkali in glass, fill an ampoule with solution of morphine hydrochloride and another with normal saline solution (7 in 1,000) and maintain at 100°C. , by steam, for an hour, or at 120°C. for half an hour. If neither turbidity nor small crystals are shown in this time the glass is of the proper quality. The importance of using neutral glass cannot be exaggerated, as the stability of the solutions and success of the method depend entirely on this factor.

It is also important to verify the capacity of ampoules. It is best to use them of a size a fourth larger than would do for the purpose, so that they need not be quite filled, and risk of breakage during sterilisation is thus diminished. It is better to put in an excess of the solution rather than too little, as there is generally a slight loss in using it, and the physician always



takes out the dose with a graduated hypodermic syringe, so that if there is a slight excess it gives him the opportunity of increasing the dose by one or two minims if he so desires.

The dispensing of ampoules may be conveniently divided into four operations : (1) Preparing the solution, (2) filling the ampoules, (3) sterilising the filled ampoules, (4) labelling and packing. The dispenser must employ only sterile menstrua. The distilled water should have been sterilised by steam at 120° C. ; olive oil or other vegetable oil used as a solvent must be washed by shaking with 90-per-cent. alcohol for four or five days, decanting, and sterilising at 125° C. ; liquid petroleum, soft paraffin, or lanoline should be sterilised at 125° C. Chemicals are generally aseptic, and do not need to be sterilised before use. In making a solution it is necessary to prepare one-quarter or three-tenths more than the total quantity required. If, for example, the physician prescribes six 1-c.c. ampoules of strychnine hydrochloride (1 in 1,000) or morphine hydrochloride (1 in 100), the dispenser must prepare about 2 c.c. extra, in order to balance the loss which occurs in filtering and transferring to the containers. With larger ampoules the loss is proportionately less. It is necessary to make 200 c.c. of solution to fill 150 to 160 ampoules (1-c.c.), and 1,000 c.c. for 750 ampoules. The solution is made up *secundum artem*, but special care must be taken to see that it is rendered brilliantly clear by filtration.

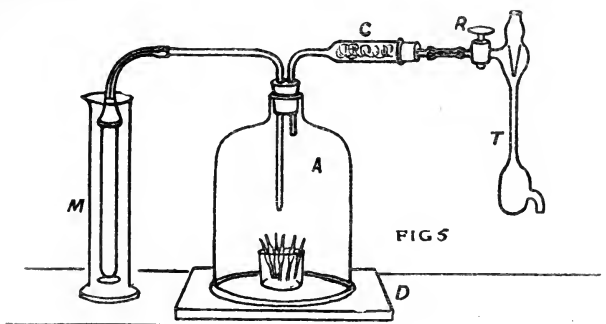
The methods of filling ampoules which can be used at the dispensing-counter are as follows :

Filling Ampoules Open at Both Ends (*e.g.*, fig. 1).—The two points being clear, one is dipped into the solution while the dispenser aspirates the other end through a piece of rubber tubing. When the ampoule is nearly full, press the rubber so as to prevent access of air, and seal the free point by holding it in the flame of a Bunsen burner or spirit-lamp. Now take off the rubber tubing and seal the other end. This method is fairly rapid, but strict aseptic conditions may demand that precautions should be taken to prevent the possibility of contamination by the breath. In this case between the body of the ampoule and the point a slight swelling is provided in which is placed—not too tightly—a tiny plug of sterile cotton-wool. If large quantities have to be filled this is

not a convenient method, but the dispenser can use one or other of the following processes.

Filling Ampoules having One Opening.—There are several ways of filling the phial-shaped ampoules or tubes which have a closed end, viz. :

1. *The Vacuum System.*—The apparatus devised by M. Eury for sterilising and filling ampoules is shown in fig. 5. It consists of a bell-jar, A, on a ground-glass plate, D, the neck of the jar being closed by a rubber stopper perforated to allow of the passage of two glass tubes. One of these glass tubes reaches half-way down the inside of the bell-jar, and the other end is joined by rubber tubing to a filter-candle standing in the beaker, M.



The second tube is bent at right angles, fitted with a receptacle, C, in which cotton-wool is placed, and further connected, by means of the stop-cock, R, with a vacuum pump, T. The various parts of the apparatus are sterilised before use. A Bohemian glass beaker is filled with empty ampoules, open end downwards, and placed under the bell-jar. The required solution is placed in the glass jar M, and a vacuum made by means of the pump. The liquid then forces its way through the filter-candle into the beaker under the bell-jar, and is sucked up by the ampoules. When sufficient liquid has passed to fill the ampoules the tap at R is turned on so as to stop the flow of water in the pump and let the air slowly into the bell-jar. The ampoules are now removed and quickly sealed. This method is a good one for such drugs as may be injured by steam sterilisation, but when the latter is admissible simpler processes suffice.

2. *Pressure System.*—The apparatus needed is that shown in fig. 6. Put the solution into the flask, and into the neck of the flask fit a cork perforated to take two bent glass tubes. One of the tubes reaches to the

bottom of the flask, and is provided at the free end with a hypodermic needle 5 cm. long. The second tube is shorter and is connected with the bellows. The hypodermic needle is placed in the open end of an ampoule, and the liquid forced into the ampoule by a slight manipulation of the bellows. This process answers well for filling large ampoules of saline solution, but a needle is not then necessary, the rubber tube being connected directly with one of the open ends of the ampoule.

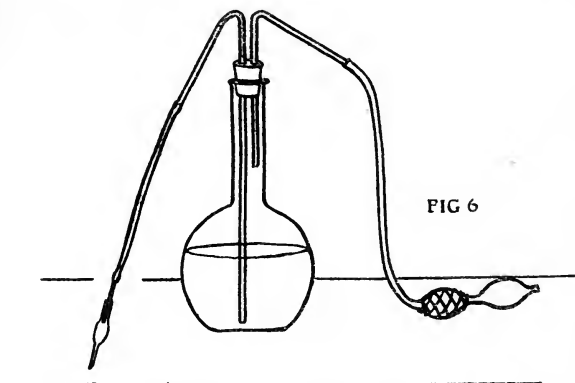


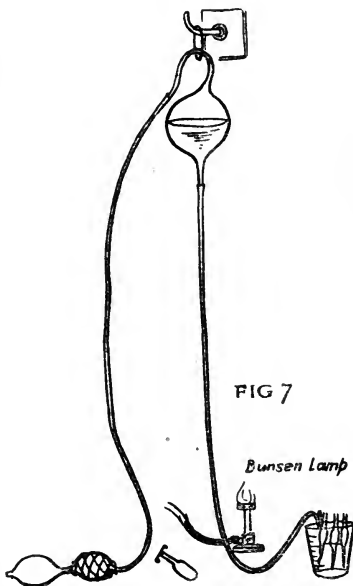
FIG 6

3. *Atmospheric-pressure System.*—This is the method which can be recommended. Fill an ampoule of a capacity of from four to eight ounces with the liquid and fix it one metre above the dispensing-counter, as shown in fig. 7. The straight point of this reservoir is connected with a rubber tube at the end of which is a platinum hypodermic needle 5 cm. long. The flow of the liquid is regulated by a Mohr's clip such as is used for burettes in volumetric work. As in the case of oily liquids, where it is desired to have more control over the fluid, a spray bellows can be connected to the bent end of the large ampoule, in which case the Mohr's clip is not needed. The ampoules to be filled are placed in a small beaker, and as soon as filled are sealed by means of the Bunsen flame.

The foregoing are the methods described by Dr. G. Pégurier in *The Chemist and Druggist*, 1909, 1. 170. Others similar are in use. The following observations by Mr. Thomas

Stephenson (*C. & D.* 1910, II. 209) may in many cases prove of service :

In preparing ampoules to prescription an ordinary hypodermic syringe is all that is necessary. The syringe should first be sterilised in the usual way. Then an ampoule is taken and the pointed end removed, as near the point as possible, by snipping sharply with scissors (holding the point downwards), or by scratching with a file and breaking off. The necessary quantity of solution, plus one or two minims to allow for loss in removal, is then drawn into the syringe, the needle inserted at the open end of the ampoule and pushed well down to prevent the liquid collecting in the neck, and the solution injected into the bulb. A little extra solution is always desirable, for the reason stated ; indeed, there is no objection to a *slight* excess over the required dose, as the physician will withdraw the required quantity into a measured syringe—a much easier matter when there is a slight excess of solution. An ordinary pessary-mould forms a useful stand for the ampoules during the process of filling, when these are of the tubular shape. The ampoule has now to be sealed. This is done by holding for a moment or two in a Bunsen flame. If held too long in the flame, the liquid is liable to become volatilised, with



the result that a bubble is blown in the end, which will not be air-tight. With a little care, however, the sealing can be effected rapidly and securely. When the ampoules contain a solution that is not injured by heat, they should be finally sterilised after sealing. This is accomplished by placing in a beaker of water and heating this in a pan of boiling water for an hour. Should a higher temperature than that of boiling water be required, suitable means can easily be adopted. The water in the beaker should be coloured with aniline blue. Should any ampoule be imperfectly sealed, the blue colour will then penetrate into the interior and colour the solution.

For this reason, and to allow for accidental breakage during the final sterilisation, it is well to prepare a few ampoules more than are actually required. An ampoule should never be filled more than two-thirds full, in order to allow some elasticity for the contents during sterilisation.

Sterilisation.—The finished ampoules are sterilised by steam in all cases where the composition of the contents admits it, otherwise filling under aseptic conditions must suffice. The advantages of steam sterilisation are that the contents of the ampoules are preserved indefinitely, and any accidental contamination during the filling process is neutralised. The temperature employed for sterilisation is 100° C. in the case of alkaloids ; 120° C. for products unaltered by heat, such as saline and gelatin solutions ; 60° C. when Tyndall's method is practised. In the last-named case the ampoules are heated to 60° C. for one hour on four consecutive days, the method being suitable for such drugs as lecithin, calcium glycerophosphate, ergotin, cocaine, and morphine. Sterilisation at 100° C. is effected by putting the sealed ampoules into a vessel of water and boiling the water for from half an hour to one hour. For sterilisation at 120° C. an autoclave is needed, and the temperature is kept constant for twenty minutes.

Finishing Off.—After sterilisation the ampoules are carefully washed, wiped dry, and labelled with an exact statement of the contents :

MORPHINE
Hydrochloride
1 c.c. = 0.01 Gm.

STRYCHNINE
Sulphate
℥xx. = gr. $\frac{1}{30}$.

They are then placed in boxes made to hold six, ten, or twelve, with space for a small steel file, with which to cut off the points before use. For ampoules of saline solution card boxes of a suitable shape are supplied.

EMBROICATIONS AND LINIMENTS.

There are seldom great difficulties in this class of preparations. Lime-water to be mixed with oils should be added all at once, and well shaken. By adding gradually, a perfectly homogeneous combination is rarely attained. See that the lime-water is fresh and of full strength. Weak lime-water is generally the cause of failures.

The following are a few examples of exceptional difficulties. The first is a hair-lotion of the character of a liniment :—

Liq. ammon.	.	.	.	.	.	.	.	℥j.
Ol. olivæ	.	.	.	.	.	.	.	℥j.
Paraffin. mollis	.	.	.	.	.	.	.	℥j.
Acet. canth.	.	.	.	.	.	.	.	℥ss.
Aq. coloniensis	.	.	.	.	.	.	.	℥j.

By a slight modification of the formula, this may be compounded as follows :—

First add gradually the acetum cantharidis to the spirit of hartshorn (use the liquor vol. cornu cervi, and not liquor ammon., B.P.), constantly stirring with a glass rod until gas bubbles no longer rise, then rub thoroughly well the paraffinum molle (use vaseline) with the oleum olivæ until a creamy compound is formed ; afterwards gradually add, little by little, the partly neutralised liquor, constantly rubbing, adding lastly the eau de Cologne.

The prescribing of oils, lanoline, and vaseline in aqueous applications (embrocations or lotions) has now become popular with medical men. The following are typical examples :—

A.				B.			
Zinci oxidi	.	.	℥j.	Zinci oxidi,			
Ichthyoli.	.	.	℥j.	Calaminæ	.	aa.	℥iss.
Olei olivæ	.	.	℥vij.	Liq. plumbi subacet.	.		℥ij.
Liquor. calcis	.	.	℥j.	Linim. calcis	.	.	℥vij.

The following is the best way to prepare A :—

Stir the zinc oxide in a mortar with the lime-water ; add the ichthyol (this has a remarkably thinning effect) ; now add the oil all at once, and triturate. This produces a nice thin cream of brown tint.

Mr. John Lothian found the following *modus operandi* to give the best results with B :—

Triturate the mixed powders in a mortar with the olive oil and transfer to a wet wide-mouthed bottle ; mix the liq. plumbi subacet. and the liq. calcis, add all at once, and shake vigorously ; a nice thick cream results. The calamine used was zinc carbonate coloured with Armenian bole.

Other examples :—

C.				
Calaminæ . . .	.	.	.	ʒij.
Zinci oxidi . . .	.	.	.	ʒij.
Olei lini . . .	.	.	.	ʒiv.
Sulphur. præcipitat. .	.	.	.	ʒss.
Lot. acid. carbolic. (1-40) ad	.	.	.	ʒxvj.

Rub the powders with water ʒss. and heat with the linseed oil on a water-bath for half an hour, stirring well all the time ; then gradually add the rest of the water, and, when cold, carbolic acid in requisite proportion.

D.				
Ung. hydrarg. ammon. dil.	.	.	.	ʒj.
Pulv. amyli . . .	.	.	.	ʒiij.
Liq. calcis . . . ad	.	.	.	ʒij.

In this case it is necessary to add soap. Dilute the B.P. ammoniated-mercury ointment with lard, add the powdered starch and pulv. saponis ʒij., mix well, and finally emulsify with the lime-water.

Lanoline is intractable with more than its own weight of water, but soap and saponifying agents facilitate emulsion, 'creams' resulting :—

Lanolini anhydrosi . . . . .	.	.	.	.	.	ʒj.
Adipis benzoati . . . . .	.	.	.	.	.	ʒij.
Liq. plumbi subacet. dil. . . . .	.	.	.	.	.	ʒvj.

Melt the fats in a warm bottle, add the liquor, and shake until cold.

Lanolini . . . . .	.	.	.	.	.	ʒss.
Sulphur. sublimat. . . . .	.	.	.	.	.	ʒss.
Mist. amygdal. amaræ . . . . .	.	.	.	.	.	ʒvj.

To be painted on every night.

Rub the lanoline in a warm mortar with 2 drachms of powdered white soap, and gradually stir in 4 ounces of the almond mixture, slightly warmed. Mix the sublimed sulphur with the rest of the almond mixture (B.P., but made with bitter almonds), and add it gradually to the contents of the mortar.

Soap is a necessary addition in many cases, *e.g.*:—

Ol. pini sylvestris	℥ss.
Lin. potass. iodid. c̄ sapone	℥iiss.

M. Fiat linimentum.

Put a drachm of powdered soap in a mortar, and mix the oil with it; then add the potassium-iodide liniment. Sooner or later the preparation becomes brownish in colour, owing to liberation of iodine due to the ozonising effect of the essential oil.

Vaseline embrocations are exceedingly troublesome. The following prescription could not be compounded by a first-class house:—

Calaminæ	℥j.
Zinci oxidi	℥j.
Vaselini	℥iv.
Aquam calcis	ad ℥iv.

A fairly good cream was made by another dispenser in the following manner:—Pour the melted vaseline into a warm bottle; add the powders, and shake; then add gradually $\frac{1}{2}$ ounce of warm lime-water, shaking well, and gradually fill the bottle with cold lime-water, constantly shaking. The *modus operandi* is intended to comminute the vaseline thoroughly, and the gradual cooling helps to keep it in suspension.

We have never been able to make a satisfactory preparation of the following:—

Ext. jaborandi liq.	℥j.
Tr. cantharidis	℥j.
Glycerini	℥ss.
Vaselini	℥ss.

The best plan is to use vaseline oil (*paraffinum liquidum*, B.P.) in place of the vaseline, mixing in the order given.

A favourite prescription with some medical men is a mixture of belladonna extract and liniment, such as the following:—

Extract. belladonnæ	℥j.
Liniment. belladon.	℥j.

It is the green extract which is here intended, and when it is rubbed up with the liniment there is an abundant separation of chlorophyll and extractive matter, which cannot be avoided. Rub the extract in a mortar with $\frac{1}{2}$ drachm of hot water ; then gradually add the liniment and strain through a small piece of calico. This is how the prescription is generally dispensed. The active principles are retained in solution. If the liniment is dispensed unstrained, the suspended matter attaches itself to the sides of the bottle. The following are similar cases which should be treated in the same way :—

A			B		
Ext. belladonnæ . . .	3j.		Ext. belladonnæ . . .	3iss.	
Tinct. iodi . . .	3iv.		Lin. camph. co. . .	3ij.	
Lin. camph. comp. . .	ad 3ij.		M. Ft. lin.		
M. Ft. lin.					

In the case of A, mix the tincture of iodine and liniment of camphor before adding to the thinned extract.

C			E		
Ext. belladonnæ . . .	3ij.		Ext. belladonnæ viridis . . .	3ij.	
Lin. ammoniæ . . .	3ij.		Ol. olivæ opt. . . .	3ij.	
Rub the extract with $\frac{1}{2}$ ounce of solution of ammonia until solution is effected ; then agitate with $1\frac{1}{2}$ ounce of olive oil.			Thin the extract with hot water, and add the oil gradually. Do not strain.		
D			F		
Ung. hydrarg. fort. . .	3j.		Coconut oil	3ij.	
Ol. olivæ	3ss.		Bay rum	3j.	
Ol. terebinth. . . .	3ss.		Tincture of nux vomica . .	3ij.	
Ol. caryoph. . . .	℥xx.		Oil of bergamot . . .	a sufficiency	
Liq. ammon. fort. . .	3ij.		Melt the coconut oil with a gentle heat. Mix the rest of the ingredients and add to the oil, stirring assiduously until it sets.		
Mixed in the above order, a good cream results.					

NEBULÆ, OR SPRAYS.

The preparations now most in vogue are solutions of alkaloids or aromatics in liquid paraffin, which is known under

various fanciful names, such as alboline, adepsine oil, chrisma-line, glymol, oleum deelinæ, paroleine, saxol, and vaseline oil. It dissolves camphor 1 in 4, carbolic acid 1 in 19, eucalyptol 1 in 9, iodoform 1 in 60, and menthol 1 in 7. Subjoined are examples of prescriptions:—

I.				III.			
Aristol.	.	.	gr. xv.	Tinct. iodi	.	.	℥xx.
Menthol.	.	.	gr. xx.	Menthol.	.	.	gr. iv.
Albolin. liq.	.	.	℥ss.	Cocain. hydrochlor.	.	.	gr. iij.
Solve.				Spt. vini rect.	.	.	℥ss.
				Aquam	.	.	ad ℥j.
II.				The tincture of iodine forms a brownish-red precipitate of cocaine, which clots, entangling most of the menthol. A preparation with diffusible precipitate was made as follows: Dissolve cocaine alkaloid and menthol in ℥j. of spirit; add the tincture of iodine, then the water, and shake gently.			
Cocainæ	.	.	gr. iv.				
Camphoræ	.	.	gr. xxiv.				
Acid. carbol.	.	.	gr. 48				
Menthol.	.	.	gr. 48				
Ol. petrol. rect.	.	.	ad ℥j.				
M.							

Nos. I. and II. present no difficulty, except that 'ol. petrol. rect.' means, strictly, water-white petroleum for burning. The prescriber undoubtedly intended liquid paraffin. Note that 'oleum' in association with 'petroleum' is a redundancy. Glycerin should not be prescribed with liquid paraffin.

The following sprays are sometimes prescribed:—

Carbolic acid gr. x., liquid paraffin to ℥j.
Chloroform and liquid paraffin, equal parts.
Citrine ointment gr. XL., olive oil ℥ss., liquid paraffin to ℥j.
Cocaine, gr. xxv., almond oil to ℥j.
Copaiba ℥j., ether ℥ij., liquid paraffin ℥v.
Creosote ℥ss., liquid paraffin to ℥j.
Ether and liquid paraffin, equal parts.
Eucalyptus oil ℥xx., liquid paraffin ℥j.
Iodine gr. j., menthol gr. v., liquid paraffin, ℥j.
Menthol gr. v. to gr. xxx., liquid paraffin to ℥j.
Tar oil ℥ss., liquid paraffin to ℥j.
Terebene ℥j., liquid paraffin to ℥j.

Aqueous sprays are also much prescribed. They are applied with a throat-spray or with a Seigle's steam-inhaler, in which the spray of the lotion is mixed with steam. The following are the strengths per ounce of solutions used in the Throat Hospital as sprays, those marked * having 15 minims of glycerin in each ounce :—

Alum gr. v. to gr. xv.

* *Borax* gr. xv.

* *Copper sulphate* gr. v.

Glycerin of borax ʒj. with S.V.R. ʒj.

* *Iron perchloride* gr. v.

Iron sulphate gr. ij.

Potassium permanganate gr. j. with
sodium chloride gr. v.

Zinc chloride gr. x. to gr. xx.

Zinc sulphate gr. x. to gr. xx.

VAPORES, OR INHALATIONS.

These are preparations which are to be inhaled with steam or heated air. They are generally solutions of aromatic substances in alcohol, but when the physiological effect of alcohol is not desired, the substance is dissolved in glycerin or suspended in water by means of *light* carbonate of magnesium, *e.g.* :—

I.					II.				
Creosoti	.	.	.	ʒj.	Ol. pini sylvestris	.	.	ʒj.	
Glycerini	.	.	.	ʒj.	Magnes. carb. levis	.	.	ʒss.	
M.					Aquæ destill.	.	.	ʒiss.	

In the second case put the magnesium carbonate in a mortar and triturate with the oil, then add the water gradually.

The following represent the quantities of medicaments for a single inhalation with a pint of water at 140° F. :—

Acetic acid ʒj., glacial acetic acid ʒj.

Aldehyde ʒx., water to ʒj.

Amyl nitrite ʒij., S.V.R. to ʒj.

Benzoic acid gr. iiij., kaolin gr. xij., water ʒss. Mix and add tincture of tolu ʒxviij., water to ʒj.

Benzoin : tr. benzoin. co. ʒj.

Camphor : spt. camph. ʒxv., S.V.R. ʒxx.

Carbolic acid (liquefied) ℥xx.

Chloroform ℥ss., S.V.R. ℥ss.

Creosote ℥xx., light magnesium carbonate gr. iiss.

Cubeb oil ℥v., light magnesium carbonate gr. iiss.

Eucalyptus oil, ℥iiss., light magnesium carbonate gr. $1\frac{1}{4}$.

Iodine tincture ℥j.

Pine oil: ol. pin. sylv. ℥v., mag. carb. lev. gr. iiss.

Sulphurous acid ℥j.

Terebene ℥v., light magnesium carbonate gr. iiss.

Thymol gr. $\frac{3}{4}$, S.V.R. ℥ $7\frac{1}{2}$, light magnesium carbonate gr. $\frac{1}{2}$.

INCOMPATIBLES.

MEDICAL MEN are but rarely good chemists, for this would necessitate longer devotion to chemistry than the average medical student can afford. Hence the importance of dispensers being thoroughly well up in the general principles of chemical incompatibility. These are to be learnt in the ordinary course of pharmaceutical studies, especially in chemistry. Chemical incompatibility is not violation of chemical laws, but the prescribing of two or more substances together which produce new compounds the therapeutic action of which may differ from that of the original substances, while the therapeutic action of the latter is partly or wholly changed. Doubtless many such changes are intentional : that is a point which will be discussed later. For convenience of reference we group together the most important of the substances which are apt to be prescribed with others, and which, on compounding, produce chemical reaction. It is to be understood that in nearly every case solution is a condition preliminary to the change.

DICTIONARY OF INCOMPATIBLES.

Acacia gum, with alcohol, borax, ferric chloride, lead subacetate, and sulphuric acid.

Acid, acetyl-salicylic, with potassium iodide and other substances decomposed by weak acids. Splits up with water into acetic and salicylic acids.

Acid, arsenious, with lime-water, magnesia, iron oxide, and vegetable astringents.

Acid, benzoic, with ferric salts, lead acetate, and mercuric chloride.

Acid, carbolic, with chloral hydrate, ferrous sulphate, and lime.

Acid, chromic, with alcohol, arsenious acid, ether, glycerin, and organic solvents and substances. (Dangerously explosive.)

Acid, citric, with acetates, potassium tartrate, and sulphides.

Acid, gallic, with iron salts, spt. æther. nit., and metallic salts generally.

Acid, hydrobromic, same as hydrochloric.

Acid, hydrochloric, with lead and silver salts and tartar emetic.

Acid, hydrocyanic, with copper, iron, and silver salts, mercuric oxide, morphine solutions, and sulphides.

Acid, hypophosphorous, with mercuric chloride.

Acid, nitric, with ferrous salts, lead acetate, and many organic substances (*e.g.*, carbolic acid), which it may, in strong solution, oxidise.

Acid, nitro-hydrochloric, with bromides, iodides, and lead and silver salts.

Acid, osmic, with alcohol, ether, ferrous salts, organic substances, and phosphorus.

Acid, oxalic, with calcium and iron salts and mineral acids.

Acid, phosphoric, with ferric chloride and lead acetate.

Acid, picric, with alkaloids and all oxidisable substances. Should on no account be compounded with phosphorus or sulphur, as it may be fatally explosive.

Acid, pyrogallic, with alkalies, copper and iron salts, and oxidising agents.

Acid, salicylic, with iron salts and spt. æther. nit.

Acid, sulphurous, with hypsulphites.

Acid, tannic, with albumen, alkalies, alkaloids, chlorates, emulsions, ferrous and ferric salts, gelatin, metallic salts, mineral acids, and tartar emetic.

Acid, tartaric, with ammonia, lime and potash salts, lead and mercury compounds, and vegetable astringents.

Acids generally, with all alkalies and their carbonates, and with metallic oxides. As the combining powers of acids vary, one acid may displace another from a compound—*e.g.*, mineral acids split up acetates (acetic acid being set free), and such organic acids as benzoic and salicylic are liberated from their salts by other acids.

Albumen, with acids, alcohol, mercuric chloride, and tannin.

Alkalies, with acids, alkaloidal salts, and most metallic salts.

Alkaloidal salts generally, with alkaline and earthy carbonates, borax, iodine and its compounds, double iodides of heavy metals (*e.g.*, Donovan's solution), mercuric chloride, syr. pruni virg., tannin, and all vegetable astringents.

Alum, with alkalies and alkaline carbonates.

Ammonium acetate, with acids, potash and soda and their carbonates, lead and silver salts, and tr. ferri perchlor.

Ammonium benzoate, with acids and ferric salts.

Ammonium bromide, with mineral acids, alkaline carbonates, chlorine, potassium chlorate and bichromate, silver nitrate, sodium nitrite, calomel, and spt. æther. nit.

Amyl nitrite, with water behaves like spt. æther. nit.

- Antimony and potassium tartrate*, with acacia gum, acids, alkalies, soap, calomel, tannin, and all vegetable astringents.
- Antimony, golden sulphurated*, with acids, bismuth subnitrate, and sodium bicarbonate.
- Antipyrin*, with acids, alkalies, calomel, cinchona preparations, copper sulphate, sodium salicylate, spt. æther. nit., syr. ferri iodid., tannin, and all vegetable astringents.
- Apomorphine hydrochloride*, with alkalies, iodine, iron salts, potassium iodide, and tannin.
- Aristol*, with alkalies, ammonia, mercuric chloride, and metallic oxides, or anything that decomposes iodides.
- Arsenium bromide and chloride* are immediately decomposed by water.
- Arsenium iodide*, with acids, mercuric chloride, and morphine salts.
- Aspirin* with water decomposes into acetic and salicylic acids.
- Atropine and its salts*, with alkalies, salts of mercury, and tannin.
- Barium chloride*, with phosphoric and sulphuric acids and their salts, carbonates and tartrates, medicinal wines, and vegetable infusions.
- Bismuth subnitrate*, with alkaline bicarbonates, calomel, gallic acid, potassium or sodium iodide, sulphur, golden sulphide of antimony, and tannin.
- Borax*, with acacia mucilage, alkaloidal salts, glycerin, and mineral acids.
- Bromides*, with chlorine, also iron, lead and silver salts.
- Caffeine and its salts*, with all alkaloidal reagents except potassium iodohydrargyrate. Also with salicylates.
- Calcium glycerophosphate*, with sodium benzoate. Solutions of the glycerophosphate tend to hydrolyse, calcium phosphate being precipitated.
- Calcium hypophosphite*, with ferri ammon. cit.
- Calcium salts*, with alkalies and their carbonates, oxalates, and sulphates.
- Calomel*, with alkalies, alkaline chlorides, antipyrin, bromides, hydrocyanic acid, iodides, organic acids, soap, and sodium carbonate.
- Chloralamide*, with alkalies.
- Chloral hydrate*, with alcohol, alkalies, calomel, carbolic acid, and potassium iodide.
- Chlorates*, with black antimony, ferrous iodide, hypophosphites, mineral acids, sulphur, and many organic compounds (dry and wet), tannin, and tartaric acid.
- Chlorine*, with alkalies, bromides, iodides, lead and silver salts, tannin, vegetable mucilages, extracts, waters, infusions, tinctures and syrups, milk, and emulsions.
- Cocaine and its salts*, with alkalies, borax, and other alkaloidal precipitants.
- Cochineal* is precipitated by salts of zinc, bismuth, and nickel as a lilac powder; iron gives a dark purple, tin a brilliant scarlet, and alumina the lakes.
- Codeine salts*, with fixed alkalies and other alkaloidal precipitants, except ammonia.

Collodion, with water or aqueous fluids.

Copper sulphate, with alkalies and their carbonates, iodides, and vegetable astringents.

Creosote, with silver oxide and other oxidisers.

Dermatol, with acids.

Digitalis preparations, with alkalies, cinchona preparations, iodides, iron salts, and lead acetate.

Diuretin, with acids and alkalies.

Europhen, with metallic oxides, mercury salts, and starch in presence of fats.

Exalgine behaves like antipyrin.

Formaldehyde, with ammonia, bisulphites, mercuric chloride, and generally it acts as a reducing agent.

Hexamine, with acids, acid salts, and quinin. et ferri cit.

Homatropine salts, with alkalies, mercuric chloride, and other alkaloidal reagents.

Hydrogen peroxide, with oxidisable substances and lime-water.

Hyoscyamine and hyoscine salts, similar to homatropine salts.

Hypophosphites, with mercuric chloride; generally act as reducing agents, greedily absorbing oxygen, and explode when rubbed with oxidisers, such as chlorates and nitrates. (A mixture of equal parts of sodium hypophosphite and nitrate has exploded violently.)

Hyposulphites, with mineral acids and soluble salts of the heavy metals.

Ichthyol, with acids.

Inf. rosæ acidum, with alkalies, borax, and liq. plumbi subacet.

Iodine, with acacia gum, alkalies, alkaloids, metallic salts, essential oils. (sometimes explosive), and fixed oils (partly absorbed).

Iron, reduced, with extracts (if acid) and metallic and alkaloidal salts.

Iron salts, with acacia mucilage (persalts), alkalies, alkaline carbonates, vegetable infusions and extracts (astringent), gallic acid, and tannin.

Iodoform, with calomel.

Kino preparations, with alkalies, gelatin, mineral acids, and metallic salts.

Lead acetate, with acids, albumen, alkalies, carbonates, chlorides, chromates, citrates, iodides, phosphates, soap, sulphates, tannin, and tartrates.

Lead subacetate, same as the last, also with acacia mucilage.

Magnesium sulphate, with alkalies, lead acetate, potassium and sodium carbonates, and tartarated soda.

Mercuric chloride, with albumen, alkalies, alkaloids, hypophosphites, lead and silver salts, methylene blue, potassium iodide, reduced iron, soap, sulphurous acid, tannin, and vegetable infusions.

Mercuric oxide, with chlorides.

Mercury iodides, with alkalies.

Mercury subchloride (see *Calomel*).

Morphine salts, with alkalies, tannin, vegetable infusions, and the usual alkaloidal precipitates.

Nitrites, with acid solutions. See *Spt. Æther. Nit.*

Nux vomica preparations, with

alkaloidal precipitants ; and note that nitric acid changes colour of mixtures.

Opium, with alkaline carbonates, chlorine-water, iodine, liq. arsenicalis, salts of copper, iron, lead, mercury, and zinc, and tannin.

Pepsin is precipitated by alcohol (above 25 per cent.) and ammonium and magnesium sulphates or any salt which saturates the mixture.

Phenocoll salts, with alkalies and their carbonates.

Physostigmine salts, apart from usual alkaloidal incompatibles, become red with ammonia owing to formation of rubeserine.

Pilocarpine hydrochloride, with alkalies, iodine, mercuric chloride, and silver nitrate.

Potash, sulphurated, with acids, carbonated waters, and zinc sulphate.

Potassium bromide (see *Bromides*).

Potassium chlorate (see *Chlorates*). Should never be rubbed with sulphur or any combustible compound, nor should strong sulphuric acid be poured over it.

Potassium cyanide, with acids, morphine salts, and silver nitrate.

Potassium iodide, with tr. ferri perchlor. and lead, mercury, and silver salts.

Potassium nitrate, with most sulphates.

Potassium permanganate, with glycerin, alcohol, and other oxidisable substances. Solutions should not come in contact with cork.

Quinine salts (dissolved), with alkalies, carbonates, tannin, and vegetable infusions.

Resorcin, with ammonia and other reagents.

Saccharin, with potassium iodide.

Salicylates (alkaline), with acids, some alkaloids, ferric salts, and spt. æther. nit.

Salol, with alkalies.

Silver nitrate, with tap-water, hydrochloric, sulphuric, acetic, and tartaric acids and their salts, hydrocyanic acid and its compounds, iodine, iodides and bromides, alkaline and earthy carbonates, sulphur, arsenites, arsenical solutions, tannin and astringent infusions, essential oils, extracts, and resins.

Silver oxide, with acids, ammonia, bromides, chlorides, creosote, iodides, and tannin.

Sodium arsenate, with syr. ferri iodidi.

Sodium nitrite, with weak acids, ammonium bromide, oxidising agents, and vegetable extracts.

Spt. ætheris nitrosi, with water, alkalies, emulsions, ferrous sulphate, gallic and tannic acids, and bromides and iodides.

Strontium salts, with phosphoric and sulphuric acids and their salts.

Strychnine solutions, with alkalies, astringents, and liq. arsenicalis.

Sulphocarbonates, with ferric salts.

Syr. pruni virg., with alkaloids.

Valerianates, with acids.

Zinc chloride, with hard water.

Zinc permanganate explodes when mixed with alcohol, extracts, glycerin, and sugar.

Zinc valerianate, with acids, soluble carbonates, tannin, and metallic salts.

DISPENSING OF INCOMPATIBLES.

It is not easy to lay down any rule for the dispenser when he comes across an incompatibility. In such cases he would do well to put to himself, previous to compounding the prescription, such questions as the following :—(1) Was this incompatibility foreseen and intended by the prescriber? (2) Does it in any way endanger the health of the patient? (3) Is it necessary to trouble the prescriber (supposing he can be communicated with) regarding the incompatibility? (4) Can the incompatibility be in any way mitigated or avoided? The following examples are given as illustrations of these remarks :—

Magnes. carb.	.	.	.	.	.	.	ʒij.
Acid. sulph. dil.	.	.	.	.	.	.	ʒiss.
Magnes. sulph.	.	.	.	.	.	.	ʒiss.
Quininae sulph.	.	.	.	.	.	.	ʒss.
Aq. menth. pip.	.	.	.	.	.	.	ad ʒiv.

Fiat mistura.

As sulphate of magnesium is already ordered in the prescription, it is improbable that the prescriber intended also the addition of this salt by extemporaneous preparation. Further, the prescriber probably adds the acid merely to assist the solution of the quinine, and an excess is added in this instance, as is generally the case with quinine mixtures. Lastly, there is the probability that the magnesium carbonate was intended to act as an antacid; so that, everything considered, there was no difficulty in substituting q.s. for ʒiss. of acid to dissolve the quinine. On the whole, however, it is better to omit the acid altogether, because the soluble sulphate of quinine will be decomposed by the magnesium carbonate. It answers well to rub the quinine to fine powder and suspend in the mixture along with the carbonate.

Potass. iodid.	.	.	.	.	.	.	ʒiss.
Nepenth.	.	.	.	.	.	.	ʒiss.
Ammon. carb.	.	.	.	.	.	.	ʒj.
Acid. phosph. dil.	.	.	.	.	.	.	ʒss.
Syr. toltan.	.	.	.	.	.	.	ʒj.
Aq. camph.	.	.	.	.	.	.	ad ʒviiij.

Fiat mistura.

It was not easy to arrive at any satisfactory conclusion as to the intention of the prescriber in this instance; but as the ammonium phosphate formed by interaction of ammonium carbonate and phosphoric acid is altogether harmless, and as free phosphoric acid in the mixture would, on exposure to light, liberate iodine from the potassium iodide and precipitate morphine from the nepenthe, there was no hesitation in dispensing the prescription as it stood.

Mucilag. acaciæ	.	.	.	.	.	ʒj.
Sodii hyposulphit.	.	.	.	.	.	ʒiv.
Ol. menth. pip.	.	.	.	.	.	ʒ xij.
Liq. bismuthi (B.P. 1867)	.	.	.	.	.	ʒiss.
Liq. morph. hydrochlor.	.	.	.	.	.	ʒij.
Aq.	.	.	.	.	.	ad ʒvj.

Fiat mistura.

This will probably appear a very innocent mixture when first dispensed, but if prepared strictly according to the letter it will bring the dispenser almost certainly into trouble. It will form a clear mixture when first dispensed, but after an interval, depending on the purity of the ingredients, it will turn first brown and then quite black, and become unfit for use. A prescription such as this should never be dispensed without an explanation to the patient of the changes which may be expected to take place, and a caution not to use the mixture after decomposition.

It is rather a neat dispensing feat to produce a black lotion from the following :—

Hydrarg. submur.	.	.	.	.	.	gr. iij.
Zinci chlorid.	.	.	.	.	.	gr. iij.
Aq. calcis	.	.	.	.	.	ʒj.

Fiat lotio.

Make the black wash first, then add the zinc chloride. In the course of a few hours the zinc chloride interacts with the black mercurous oxide, and the lotion becomes white. It is therefore just as well to add the zinc chloride to the lime-water in the first instance.

Hyd. ox. flav.	3j.
Liq. ammon. fort.	3iiss.
Chloral. hydratis	3j.
Glycerini	3ij.
Inf. rosmarini	ad 3vj.

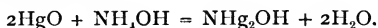
Et adde—

Tr. canth.	3j.
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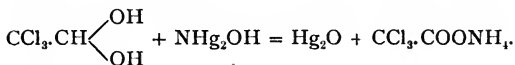
Ft. lot.

To be applied to the scalp once a day.

Here the oxide of mercury is changed to black suboxide. The prescription is very interesting in more ways than one. There is for the pharmacist to consider the meaning of the writer ; he might pause, and wonder if a fluid which has every appearance of 'black wash' is what was intended for a 'scalp' application. It is easy to imagine the dirty condition the head would be in after a few applications, although, in cases of ring-worm, more unsightly and sticky applications are often used. The chemistry of the lotion will be best understood when it is considered that ammonia and oxide of mercury form mercurio-hydroxylamine, thus :—



This compound is readily reduced in the presence of a substance capable of oxidation. This we have in chloral hydrate, which is oxidised to trichloroacetic acid, the ammonia salt of which is formed in the presence of free ammonia, thus :—



Many decompositions are intentional, as in the case of *mist. ferri co.*, B.P., or the frequent combination of tincture of opium with solution of subacetate of lead for injections ; also in the following :—

Ext. conii	3ss.
Liq. plumbi subacet.	3ss.
Aquam	ad 3vj.

M. Ft. lot. *Modo dicto utend.*

Here an abundant precipitate renders the lotion almost creamy, and necessitates mixing half the water with the extract, and the remainder with the liquor before mixing, else a disagreeable lumpy product results. Such combinations may be dispensed as written, and sent out with a 'shake' label.

Occasionally, however, the decompositions are of such a character that the chemist may feel pretty sure the writer of the prescription is unacquainted with the reaction or has overlooked it. For example :—

Sodii sulphat.	. . . gr. xv.	Zinci sulphat.	. . . ʒj.
Potass. cit.	. . . ʒj.	Plumbi acet.	. . . ʒij.
M. Ft. pulv.	Mitte vj.	M. Ft. pulv.	Modo dict. utend.

In these cases metathesis takes place, the water of crystallisation of the sulphates is liberated, and the powders become wet. The use of an equivalent quantity of the dried salts removes the difficulty.

The following prescription has become famous in textbooks :—

Strychninæ sulph.	. . . . . gr. j.
Potassii bromid.	. . . . . ʒvij.
Aquam	ad ʒviiij.

Fiat mistura.

This solution deposits in a few hours the greater part of the strychnine salt as an insoluble bromide in transparent crystals. A lady in England lost her life by taking a similar mixture : the precipitated strychnine collected at the bottom, and in taking the last dose she swallowed nearly all of it. Potassium iodide also precipitates strychnine.

One of the most remarkable cases of incompatibility is the following, which at first sight appears perfectly harmless, but at least one case of death is on record from the administration of a similar mixture :—

Potassii chlorat.	. . . . . ʒij.
Syr. ferri iodidi	. . . . . ʒvj.
Vin. antim.	. . . . . ʒss.
Æther. chlor.	. . . . . ʒij.
Aq.	ad ʒviiij.

Fiat mistura.

This mixture is almost colourless when first prepared, but rapidly acquires a reddish-brown colour, and after a few days crystals of iodine are deposited. This is due to the action of potassium chlorate on ferrous iodide ; the latter being oxidised by the former, potassium chloride is produced, iodine set free, and, finally, ferric hydroxide precipitated.

Incompatible mixtures are sometimes the result of impurities in the drugs used, thus :—

Sodii hyposulph.	.	.	.	.	.	.	3j.
Acid. sulphuros.	.	.	.	.	.	.	3j.
Aq. rosæ	.	.	.	.	.	.	ad 3viij.

The acid invariably contains some sulphuric acid, which throws out sulphur from the hyposulphite.

Liquoris hydrargyri perchloridi	.	.	.	.	.	3j.
Ammonii carbonatis	.	.	.	.	.	gr. v.
Potassii iodidi	.	.	.	.	.	gr. v.
Aquam.	.	.	.	.	.	ad 3j.

Misce pro dose. Mitte 3viij.

Although an alkaline carbonate forms a precipitate with mercuric chloride, still, if in the above mixture the first and third ingredients be mixed, and the solution of the carbonate then added, no precipitate occurs. If common water be used, a slight precipitate of calcium carbonate forms, but it is free from mercury. As previously mentioned, mercuric chloride forms clear solutions with some tap-waters.

EXPLOSIVE AND INFLAMMABLE COMPOUNDS.

Whenever substances rich in oxygen or easily deoxidised are ordered to be mixed with other ingredients, the dispenser should always carefully consider the order of mixing. Such substances should never be rubbed with easily oxidisable bodies.

Substances which easily part with their oxygen are picric acid, and chlorates, iodates, bichromates, permanganates, nitrates, and picrates, and oxide of silver. In compounding

these substances each should separately be first rubbed to a powder in a mortar, then be mixed with the safe ingredients, and lightly blended on paper with a bone spatula. The more common oxidisable substances are charcoal, organic powders, iodine, sulphur, sulphides, reduced iron, iodide of iron, hypophosphites, camphor, essential oils, and ammonia salts.

The following are specimens of explosive compounds :—

	Grammes
Potass. chlorat.	2·0
Lactis sulphuris	3·0
Antim. sulph. aur.	0·5
Zinci valerianatis	0·5
Sacchari	5·0

M. Ft. pulv. Divide in partes 20 æquales.

The potassium chlorate should first be rubbed to a fine powder; the other ingredients should be separately mixed; lastly, the chlorate should be combined with the other powders by mixing on paper with a bone spatula. The pressure of a pestle may induce a dangerous explosion—indeed, chlorates are amongst the most explosive compounds known, and should always be handled carefully. The same applies to hypophosphites—always rub them gently, and be careful how you apply heat to them, either when dry or in solution, especially with glycerin.

Explosion took place in the following when the oil of peppermint was added :—

Potassii chloratis	ʒss.
Acidi tannici	gr. iv.
Ol. menthæ piperitæ	ʒij.

Fiat pulvis.

Even without the oil the powders explode if rubbed hard in a mortar.

Oxide of Silver, if to be combined with any organic substance, should be first damped with water. If creosote is compounded with oxide of silver in a pill, it will explode. Pills containing oxide of silver are liable to inflame if they become

warm. They have taken fire in a person's pocket, causing severe burns. (See also page 101.)

Nitrogen Compounds.—Tincture of iodine and ammonia are often prescribed together, and iodide of nitrogen is produced under certain conditions. An explosion has resulted from the preparation of the following prescription, iodide of nitrogen being evidently the cause:—

Iodi	3ij.
Lin. camph. co.	3j.
Lin. saponis co.	3j.

M.

A concentrated solution of iodine and iodide of ammonium was filtered through paper. The next day the filter was touched with a view to being removed, when the paper and funnel were shivered into atoms with a loud explosion.

Reference has been made to the incompatibility of iodine with essential oils. The reaction may be so rapid as to cause explosion. This happened with the following:—

Iodi	10·0
Alcohol.	30·0
Ol. terebinthinæ	100·0

Fiat solutio.

Erythrol Tetranitrate should be handled with great care. In consequence of a fatal accident to a young chemist at Dartford in 1897 (he was mixing the tetranitrate with sugar of milk in a mortar when the whole thing exploded) the Chief Inspector of Explosives advises dispensers that the tetranitrate 'is more sensitive to percussion than dynamite or guncotton.' A medical man threw a sample bottle of the drug into his waste-paper basket. Next morning the basket was emptied into a dustpan containing hot ashes. An explosion ensued, and the housemaid was partly stunned, and received about two dozen small wounds on the hands, arms, and face. *Mannitol hexanitrate* explodes violently on being struck with a hammer, or when suddenly heated.

Therapeutical Incompatibility is much too wide a subject to discuss in this volume, nor is it one which a pharmacist can adequately treat. Prescribers rarely sin in this respect, and it is noteworthy that many of the apparent therapeutical incompatibles are not so in reality, for the physiological actions of some substances are exerted or completed before others begin, so that such things may be given together quite appropriately. Doctors are very fond of giving ammonia with salicylates: they must have free ammonia to act as a heart-stimulant, because the salicylate is somewhat depressing. The mixture is chemically incompatible, and becomes brown in a few days, but it acts well nevertheless.

As a rule it is inadvisable to prescribe glucosidal bodies in aqueous mixture, especially in presence of acids, because the bodies sooner or later hydrolyse, and thus the therapeutic action may be obliterated or untoward results occur. This is observed in the case of tincture of strophanthus, which in aqueous mixture, kept for a week or two, produces disagreeable purgation and little effect on the heart. Pharmacists may be able by observation and application of their peculiar knowledge to explain such things to prescribers, but it is scarcely their province to interfere in supposed instances of therapeutical incompatibility.

FOREIGN PRESCRIPTIONS.

IN seaport towns, health-resorts, and cities in which foreigners sojourn, chemists and druggists are frequently called upon to dispense prescriptions of foreign origin, and it sometimes happens that, owing to want of the necessary initiation into the not very formidable intricacies of foreign dispensing, customers are told that the prescription they have presented for dispensing, being a foreign one, cannot be made out. The consequence, probably, is that the customer goes and gets elsewhere that of which the chemist who turns him away has an abundance on his own shelves, if he was only aware of it. In this chapter such information regarding French and German methods of dispensing is given as will assist in the compounding of continental prescriptions. In the Appendix will be found a table of terms likely to occur in French, German, and other foreign prescriptions.

GERMAN PRESCRIPTIONS.

The most confusing thing about German prescriptions is the chemical nomenclature, of which the following is a fair example :—

Kali hydrojodici	.	.	.	.	.	.	6,0
Aquæ depuratae	.	.	.	.	.	.	180,0

Rendered into Anglo-Latin, this is :—

Potassii iodidi	3iss.	} nearly
Aquæ destillatæ	3vj.	

In dealing with German prescriptions the difficulty of the nomenclature, independently of minor grammatical differences, resolves itself into acquiring the English terms for a limited number of drugs and preparations. The use of the adjective

is, perhaps, the most striking deviation from the Anglo-Latin nomenclature. Thus, for *ferrum sulfuricum* we should read, according to English custom, ferri sulphas; for *ferrum iodatum*, ferri iodidum, and so on. With the exception of particular instances mentioned hereafter, nearly everything will, with a very little thought, be self-evident to the dispenser sufficiently well up in his Latin not to fall into the error attributed to an American *confrère*, who sent to his wholesale house for a supply of 'aqua fervida.' There still exist, however, in various parts of the Continent, medical men of the old school, who, in addition to prescribing by the old grain, drachm, and ounce system, make use of some of the cabalistic signs handed down to us from past generations. Four of these are met with as abbreviations rather frequently, viz. : ♂ for pulvis, V for aqua, # for saccharum, and ☿ for spiritus. The following are old terms most frequently met with :—

<i>For</i>	<i>Acetum plumbi</i>	<i>read</i>	<i>Liq. plumbi subacet. fort.</i>
„	„ saturninum	„	„ „ „
„	Aqua saturni	„	„ „ „ dilutus
„	„ phagedænica	„	Lotio hydrargyri flava
„	„ fontana	„	Aqua pura
„	Aquila alba	„	Hydrargyri subchloridum
„	Deutojoduretum hydrargyri	„	„ „ iodid. rubrum
„	Flores benzoës	„	Acidum benzoicum
„	„ naphæ	„	Flores aurantii
„	„ zinci	„	Zinci oxidum
„	Gummi mimosæ	„	Gummi acaciæ
„	Lapis infernalis	„	Argenti nitras
„	Magisterium bismuthi	„	Bismuthi subnitras
„	Mercurius	„	Hydrargyrum
„	Natro-kali tartaricum	„	Soda tartarata
„	Natrium carbonicum acidulum	„	Sodii bicarbonas
„	Nihilum album	„	Zinci oxidum
„	Oleum anthos	„	Oleum rosmarini
„	Oleum de citro	„	Oleum limonis
„	Protojoduretum hydrargyri	„	Hydrarg. iodid. viride
„	Pulvis Kurellæ	„	Pulv. glycyrrh. comp.
„	Saccharum saturni	„	Plumbi acetas
„	Sal amarum	„	Magnesii sulphas
„	„ mirabile	„	Sodii sulphas

<i>For</i> Syrupus diacodii	<i>read</i> Syr. papav. alb.
„ Tinctura thebaica	„ Tinct. opii

More modern deviations from the Anglo-Latin nomenclature are given below, those adopted by the German Pharmacopœia having the prefix P.G. :—

<i>For</i> Acidum phenylicum	<i>read</i> Acid. carbolic.
„ P.G. Aqua chlorata	„ Liq. chlori
„ P.G. Bolus alba	„ Kaolinum
„ P.G. Calcaria usta	„ Calx
„ P.G. Chininum	„ Quinina
„ P.G. Cortex chinæ	„ Cinchona
„ P.G. Flores cinæ	„ Santonica
„ P.G. Gutti	„ Cambogia
„ Hydrargyrum amidato-bichlorat	„ Hydrarg. ammoniat.
„ P.G. Hydrargyrum bichloratum	„ Hydrargyri perchloridum
„ P.G. Hydrargyrum chloratum	„ Hydrargyri subchloridum
„ P.G. Kali	„ Potassa
„ P.G. Kalium	„ Potassium
„ Linimentum volatile	„ Linim. ammoniæ
„ P.G. Liquor ammonii caustici	„ Liq. ammoniæ
„ P.G. Methylsulfonalum	„ Trional
„ P.G. Natrium	„ Sodium
„ P.G. Natrum	„ Soda
„ P.G. Pyrazolonum phenyl-dimethylicum	„ Phenazonum
„ P.G. Pyrazolonum phenyl-dimethylicum salicylicum	„ Salipyrin
„ P.G. Radix liquiritiæ	„ Glycyrrhizæ radix
„ P.G. Secale cornutum	„ Ergot
„ P.G. Semen strychni	„ Nux vomica
„ P.G. Stibium	„ Antimonium
„ Sulfur auratum	„ Antimon. sulphurat.
„ P.G. Tartarus depuratus	„ Potass. bitartras
„ P.G. „ natronatus	„ Soda tartarata
„ P.G. „ stibiatus	„ Antimon. tartarat.
„ P.G. Tinct. opii benzoica	„ Tinct. camph. co.
„ P.G. „ strychni	„ „ nucis vom.
„ P.G. Vinum stibiatum	„ Vin. antimoniale

Preparations peculiar to German pharmacy which will require reference to the German Pharmacopœia, or to 'Pharmaceutical Formulas' or 'Hager,' are :—

Ammonium chloratum ferratum (Ammon. muriatico-ferratum)	Sal thermarum carolinensium (Sal carolinum factitium)
Elixir aurantiorum comp.	Sapo jalapinus
Elixir e succo liquiritiæ (Elixir pectorale)	Species laxantes (St. Germain)
Elixir proprietatis (Paracelsi)	Species lignorum
Ferrum aceticum (liq. and tinct.)	Species pectorales
Ferrum pomatum (ext. and tinct.)	Spiritus formicarum
Linimentum saponato-camph.	Spir. saponis
Liq. aluminium acetici	Tinctura amara
Liq. ammon. anisatus	Tinct. ferri chlorati ætherea (Tinct. nervina Bestucheffii)
Mixtura sulfurica acida (Elixir acidum Halleri)	Tinctura lignorum
Mixtura oleoso-balsamica (Bal- samum vitæ Hoffmanni)	Tinctura opii crocata (Laudanum liquidum Sydenhami)
Mucilago salep	Unguent. Hebræ
Oleum hyoscyami coctum	Vinum aromaticum

The above have been selected as being what may be called of every-day occurrence, and, although a knowledge of them does not constitute all that is required of a German dispenser quite *au fait* with his work, it will help to clear away many *primâ-facie* difficulties.

All quantities ordered are understood to be by weight, fluid measures not being countenanced by the German authorities. The minim is still frequently represented by the drop (*gutta*), but this is measured by the international normal drop-measure. The tare of the dispensing-bottle being taken, the various ingredients ordered on the prescription are successively weighed into it, commencing with the smallest quantities and finishing with the vehicle. For this purpose English bottles may be said to hold 30 grammes or more per ounce capacity of water and denser fluids respectively, or 24 grammes of spirit or tinctures.

The very convenient way of prescribing the vehicle, *ad* so many ounces, is adopted by but few foreign physicians, and the few who do so have mostly practised some time in this country.

As in England, mixtures predominate in German prescribing. Solutions of extracts (such as ext. taraxaci, trifolii, and graminis), decoctions and infusions, and oil or seed emulsions, occur, however, somewhat more frequently. Decoctions

and infusions are directed to be recently prepared, and, if definite proportions are not indicated by the prescriber, are to be made in the proportion of 1 in 10. Seed emulsions, prepared from almonds, poppy, hemp, or henbane seeds, are also 1 in 10, and are made by crushing the seeds, with the addition of a little water, in a metal mortar, until a pasty, homogeneous mass is produced, to which the bulk of the water is gradually added, and the resulting milky fluid strained through flannel. Oil emulsions are, according to the Ph. Germ., directed to be made of oil 2, gum acacia 1, and water 17 parts.

The Potio Riverii of the Ph. Germ. is a fair type of what are called 'saturations'—*i.e.*, an alkaline carbonate saturated with an organic acid, the carbonic acid evolved being partly absorbed by the vehicle. The proportions are : Citric acid 4, sodium carbonate 9, water 190.

Draughts, in the strict application of the term, are almost unknown. Drops, however, are a favourite form of administering medicines. They usually consist of tinctures or a solution of extract or alkaloid.

Pills are not, perhaps, quite so much in vogue as in England, but large quantities are sometimes prescribed, 120, or even 360, being ordered for one patient. Pill-machines being made to cut 30, that number or its multiples are generally ordered. Their weight scarcely ever exceeds 2 grains, 4 or 5 grain pills being quite the exception. Lycopodium is very generally employed to roll the pills in, unless some other powder, such as p. cinnamomi, is specially prescribed, and gold and silver coating is sometimes ordered.

Powders to the number of 12, 16, 24, or 48 are also much in request. When not directed to be divided off into doses they are dispensed in bulk, to be taken by the teaspoonful ; in the latter case they are ordered 'ad scatulam,' or, if they contain elæosacchara, narcotic extracts, camphor, musk, or other volatile substances, 'ad vitrum.' Extracts to be incorporated with powders are kept as 'extracta sicca,' prepared by evaporating on the water-bath a mixture of 4 parts of extract and 3 parts of powdered rad. glycyrrh. until

constant weight, and adding pulv. rad. glycyrrh. q.s. to make 8 parts. Similarly, solutions of narcotic extracts are prepared: Extract 10, water 6, alcohol 1, glycerin 3. Elæo-sacchara are mixtures consisting of 1 part of oil to 50 parts of sugar. Volatile substances, when ordered in powders divided off into doses, are ordered 'in charta cerata'—*i.e.*, waxed paper. Either the dose for each powder is prescribed, with the direction 'dentur tales doses No. *x*,' or the ingredients for a number are ordered in the aggregate, with an intimation to 'divide in partes æquales No. *x*.'

Ointments are much of the same nature as in England and do not call for special remarks. Ungt. hydr. fort. is occasionally prescribed, weighed off in quantities from 1 to 4 grammes, to be wrapped up separately in waxed paper to the number of 12 to 20. Plasters are sometimes ordered in bulk for the patient to spread them himself. Empl. vesicatorium stands for empl. cantharidis.

Directions for use are invariably written in German, certain abbreviations being made use of—*e.g.*, 3 tgl. 1 Essl. = Dreimal täglich einen Esslöffelvoll—*i.e.*, one tablespoonful three times daily ('to be taken' being understood); 2 stl. 1 Teel. = Zweistündlich einen Teelöffelvoll—*i.e.*, a teaspoonful every two hours. The following words occur constantly:—

Esslöffelvoll	=	tablespoonful	Pulver	=	powder
Teelöffelvoll	=	teaspoonful	Aeusserlich	=	for external use
Kaffelöffelvoll	=	ditto	Morgens	=	in the morning
Kinderlöffelvoll	=	dessertspoonful	Abends	=	in the evening
Tropfen	=	drops	In Wasser	=	in water
Einreibung	=	embrocation	Auf Zucker	=	on sugar
Einspritzung	=	injection	Zu nehmen	=	to be taken
Umschlag	=	poultice	Umgeschüttelt	=	to be shaken
Salbe	=	ointment	Waschmittel	=	lotion
Pillen	=	pills			

When prescribing doses of the more active substances in excess of the Pharmacopœia maxima the physician adds a note of exclamation after the weight (thus: morph. acet., 0.05 !), to indicate that he is well aware of the fact and takes the responsibility on himself.

The word 'cito!' or even 'citissime!' is sometimes added, to signify to the dispenser that the prescription is to be dispensed immediately, as, if delayed, the patient's life may be endangered.

Facsimile Prescriptions.—The difficulties of nomenclature over, the dispenser has now to face the handwriting of German prescriptions, which differs materially from English handwriting. A knowledge of this can only be acquired by practice with the originals, of which we submit a few that will be found useful for exercise and reference. It may surprise English dispensers to learn that these are selected rather for purposes of illustration than as being particularly difficult ones, though one or two present some hard nuts to crack. We add the correct reading of and occasional comments on these prescriptions:—

Rp. Apomorph. mur. 0.04
 Morph. mur. 0.02
 145. Aquæ amygd. amar. 5.0
 Elix. pector. 20.0
 Aqu. destill. 30.0
 Syr. simpl. 15.0

mds 4x täglich
 in 1/2 Tasse

Rp. Apomorph. mur. cryst.	. . . . .	0.04 ($\frac{3}{5}$ gr.)
Morph. mur.	. . . . .	0.02 ($\frac{3}{10}$ gr.)
Aquæ amygd. amar.	. . . . .	5.0 (77 grs.)
Elix. pector.	. . . . .	20.0 ($\frac{1}{2}$ oz. av. 85 grs.)
Aqu. destill.	. . . . .	30.0 (1 oz. av. 25 grs.)
Syr. simpl.	. . . . .	15.0 ($\frac{1}{2}$ oz. av. 13 grs.)

M. D. S. 4 mal täglich einen Teelöffelvoll.

In this prescription the quantities are, as usual, given in metric weights. The liquids, as well as the solids, should be weighed into the bottle, which by preference should be of black glass, in order to prevent decomposition of the apomorphine.

The aq. amygd. amar. of the prescription is the aqua lauro-cerasi, and elixir pectorale is the elixir e succo liquirit. of the German Pharmacopœia.

The directions mean 'four times daily one teaspoonful.'

The mark 1'45 in the margin means that the price charged was 1 mark 45 pfennige = 1s. 5d. The price is regulated in Germany by a Government tariff which the pharmacist may not exceed under penalty of a heavy fine.

Chinini muriat.
 185. 1.0
Aqu. dest. 30.0
Acid. muriat. dil. 54. g.
 J. *Pharm. Hage*
Munich 1881.

Chinini muriat.	.	.	.	.	.	.	1'0
Aqu. dest.	.	.	.	.	.	.	30'0
Acid. muriat. dil.	.	.	.	.	.	.	q.s.

S. Nachmittags einen Esslöffelvoll.

This is quoted chiefly for the directions, which are rather unusual—namely, a tablespoonful in the afternoon.

L. 30 Ma Iodoform. 3/1
 Ungt. cerei
 o. a. ep. l. Vasel. alb. 2/10
 Cumarin. 0/1
 M. Ft. ung. D. S. Mgs. einzureiben.
 Dr. Mgs. einzureiben

Iodoform.	3'0	Vasel. alb.	10'0
Ungt. cerei	10'0	Cumarin.	0'4

M. Ft. ung. D. S. Mgs. (Morgens) einzureiben.

An ointment 'to be rubbed in, in the morning.' The ung. cerei is composed of arachis oil 7 parts and yellow wax 3 parts. The letters on the margin—'o. a. ep. l.'—stand for 'olla alba epistomio ligneo'—a white jar with wooden top. Price charged, 1m. 3opf.

Prescritt. diuine
 comp.

— vasc. ether.

2311.
 M. Ft. alb. 2/10
 1/10 Mgs. auf Zucker.
 Dr. Mgs.
 Cito! Dr. Mgs.

Rp. Tinct. chinæ comp.

„ valer. æther. a. ʒij.

M. D. S. Alle 2 Stunden, 15 Tropfen auf Zucker.

This is written by one of the old-fashioned doctors who still use the old measures. The directions mean 'fifteen drops on sugar every two hours.' Observe the word 'cito!' at the end of the prescription as an injunction to the dispenser.

Handwritten prescription:
 Rp. Coffeini
 Sacch. albi
 50 gr. 3
 Morg. 5
 Abends 5
 cito!

Rp. Coffeini centig. 3
 Sacch. albi decig. 5

M. Ft. pulv., d. tales dos. No. IV. S. Morg. und Abends ein Pulver.

This prescriber looks like taking first prize for bad writing in this competition. 'Caffeine' in English is 'coffein' in German. The doctor's peculiar care to write out 'centig.' and 'decig.' assists marvellously to obscure his prescription for foreign readers. Price charged, 50pf. = 6d.

6
 T. Rhei vinos 8,00
 0,85 Valer. 4,00
 Elix aur comp
 800
 18-20

Rp. Tinct. rhei vinos.	6.00
„ valer.	4.00
Elix. aur. comp.	8.00
D. S. Zweimal täglich, 18-20 T.	

Vinous tincture of rhubarb is made of rhubarb 8, orange-peel 2, cardamoms 1, and sherry 100 parts. The directions are given here very curtly, but no doubt mean '18 to 20 drops twice daily.' Price charged, 0.85pf.=10d.

Solut. zinci sulph. (0.5) 200.0
 0.70 1/2 (0.5) 200.0
 1/2 in 200.0

Solut. zinci sulph. (0.5)	200.0
S. pro injectione.	

This is simple enough. Half a gramme of sulphate of zinc to be dissolved in 200 grammes of water.

Camf trit. 37
 Tere c
 16450 Mucil. g. arab. 3 IV
 Laud. liq. Syd. 37
 Syr. # 3 VII
 V. dest. 3 VI
 D. Morgens u. Abends
 einen Eßlöffel voll

Camf. trit.	.	.	.	.	.	.	.	3j.
Tere c								
Mucil. g. arab.	.	.	.	.	.	.	.	3iv.
Laud. liq. Syd.	.	.	.	.	.	.	.	3ij.
Syr. #	.	.	.	.	.	.	.	3vj.
V. dest.	.	.	.	.	.	.	.	3vj.

D. S. Morgens und Abends einen Esslöffel voll.

In this prescription we come across the old Arabic signs for sugar and water. The directions mean 'one tablespoonful night and morning.'

Chinin. sulfuric.

14 1/2

Gram 2

Extract. Valerian.

Gram 4

Extract. Tarax.

Rad. Alth. 5:0.

110. 0. 5.

ut f. pilul. No. 60.

Conspr. Pulv. Cass. Cinnam.

D. S.

*Unmittel täglich vier Pillen
zu nehmen.
S.*

Chinin. sulfuric.	.	.	.	.	.	gram. 2
Extract. valerian.	.	.	.	.	.	gram. 4
Extract. tarax.	.	.	.	.	.	q.s.

Ut f. pilul. No. 60. Conspergantur pulv. cass. cinnam. D. S.
Dreimal täglich vier Pillen zu nehmen.

The only point about this prescription which needs explanation is the interpolation of the dispenser, who found that 1 gramme extract. tarax. and 5 grammes of an inert substance, for which he chose pulv. rad. althææ, were required to make the mass. The pills were rolled in cassia, *not* cinnamon.

10 Iod. pur. 9.5
 20
 30 Kalii iodat. 2,
 30
 10
 1.10 Mk ungt. paraff. 20,
 o. gris. ungt. 14.
 dispensat.

Iod. pur.	.	.	.	.	.	.	.	0.5
Kalii iodat.	.	.	.	.	.	.	.	2.0
Ungt. paraff.	.	.	.	.	.	.	.	20.0
F. ungt.	D.	S.						

It is hardly necessary to say that for 'kalii iodat.' iodide of potassium is intended. 'Ungt. paraff.' is a mixture of ceresin 4, liquid paraffin 5, wool-fat 1. On the margin the dispenser has run out the calculation of his charge as by law allowed. The first three figures are for the ingredients, the last for the vessel, and the others for the mixing and the labelling, &c., making 1s. 1d. in all. The 'o. gris.' means that the ointment was dispensed in an earthenware pot—*olla grisea*.

für Herrn Louis
 20 Salz-Thannenbäder
 2-3-mal in der Woche ein Bad
 Wärme = 27.°R.
 Dauer der Bäder 12 Minuten
 auf 1 Bad = 6 M. Langfurts. Badessalz
 v. Thaurberg.

This is a direction to a patient rather than a prescription. It is as follows:—

Transcription.

Für Herrn Lions.

20 Salz-Wannenbäder.

2-3 mal in der Woche ein Bad.

Wärme = 27° R.

Dauer des Bades, 12 Minuten.

Auf 1 Bad = 6 lb. Stassfurter Badesalz.

Translation.

For Mr. Lions.

Twenty full-length salt-baths.

One bath twice or three times a week.

Temperature (of the water) to be 27° R. (93° F.).

Patient to remain in the bath twelve minutes.

Add 6 lb. Stassfurt bath-salt to each bath.

℞ Salol 0.06
 Nat. bicarbonic 0.03
 N. 12

℞ Bismuth. salicyl. 0.1
 N. 6

Transcription.

℞ Salol 0.06

Nat. bicarbonic. 0.03

N. 12.

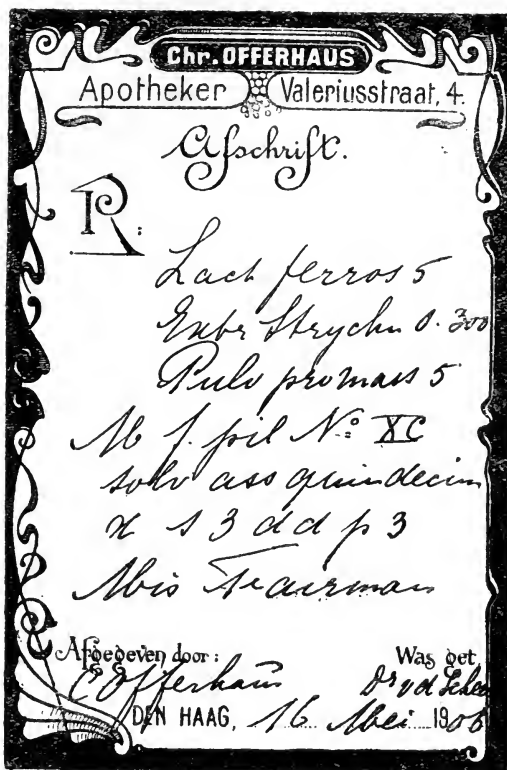
℞ Bismuth. salicyl. 0.1

N. 6.

Chinini ferro-citrici
 3,0
 Coffeino-natrii salicylici
 3,5
 Pulveris et
 Extracti
 2 3,0
 Mixture No. 60. 2
 Be 2541 1/2

<i>Transcription.</i>		<i>Latin.</i>
Chinini ferro-citrici . . .	3.0	Quininæ et ferri cit. . . gr. 48
Coffeino-natrii salicylici . . .	3.5	Caffeinæ sodio-salicylatis . gr. 56
Pulveris et		Pulv. radic. gentianæ,
Extracti gentianæ . . . aa	3.0	Extracti gentianæ . aa. gr. 48
Misce fiant pilul. No. LX.		F. massa pilular., ex qua formen-
D.S. 2mal täglich 1 Pille.		tur pilulæ No. 60.
		One pill twice a day.

The following is not German, but may be included here.



The transcription and translation are :—

Transcription.

Lactatis ferrosi . . . 5
 Extracti strychni . . . 0.300
 Pulvis pro massa . . . 5
 Misce fiant pilulæ Numero xc.
 Solvit asses quindecim.
 Da signa ter de die pilulas tres.

Translation.

Lactate of iron . . . 5 grammes
 Extract of nux
 vomica . . . 0.300 gramme
 Powder for mass . . . 5 grammes
 Mix, make 90 pills.
 He pays fifteen pence.
 Label: 'Three pills three times
 a day.'

The phrase 'solv. ass. quindecim' baffled C. & D. subscribers, and Miss Offerhaus explained that it is a method of pricing.

FRENCH PRESCRIPTIONS.

The art of dispensing 'as in France' is fairly told in the following description of a week's work by an English dispenser in a French pharmacy, the work consisting of 33 potions (mixtures), 1 suppository, 9 powders, 5 drops, 5 solutés (solutions), 1 inhalation, 4 collutoires (collutoria), 9 pommades (ointments), 10 syrups, 3 hypodermic injections, 7 cachets, 4 liniments, 3 pills, 2 wines, and 4 mélanges.

The Codex gives some general directions to be observed in the preparation of potions. In the case of decoctions and infusions the usual proportions are 2 in 100 for leaves and flowers, and 4 in 100 for woods, roots, and stems. All powders, vegetable or mineral, it directs, should be divided by the syrup or gum which may be prescribed. Kermes mineral, which is frequently occurring, should be well triturated with sugar before the addition of the other ingredients, and all volatile substances, such as ethers, should be added last. Tinctures should be mixed with the syrup before the addition of the other ingredients. The first prescription containing the mineral illustrates the difficulties of the dispenser, and also, what is of far greater importance, the general inaccuracy of the French system. It runs thus:—

Kermes minéral	.	.	.	.	.	0·10 gramme
Gomme arabique	.	.	.	.	.	q.s.
Eau distillée	.	.	.	.	.	150 grammes
Teint d'aconit	.	.	.	.	.	6 gouttes
Sirop diacode	.	.	.	.	.	30 grammes

Frequently this would be dispensed without gum, as the quantity of powder is so small. The uncertainty as to the use of the gum is troublesome, and so is the quantity of tincture, as drop-measures are unknown. Referring to the Codex; we find that the normal (international) drop-measure should be a glass tube with a capillary opening, having an outside diameter of 3 millimetres, capable of giving drops of distilled water of which 20 will weigh 1 gramme. Practically these tubes are in very little use, the rough-and-ready practice of dropping from

the bottle being much more prevalent—in fact, in a large dispensing business it would be difficult to find the time to do otherwise.

The prescription, however, has the advantage of equalling by weight exactly the contents of a 180-gramme bottle, or about an ordinary 6-ounce English bottle—a circumstance for which the dispenser is always thankful. The next presents a dilemma in that respect :—

Teint d'aconit	5 gouttes
Teint de belladonne	1 goutte
Sirop fleur d'oranger	40 grammes
Eau distillée	30 „

In this case a 60-gramme or 2-ounce bottle will not contain the exact weight ; it has, however, been dispensed to fill both a 2-ounce and a 3-ounce bottle—which makes an important difference in the dose of one teaspoonful every half-hour—and also in a 3-ounce bottle, not filled, but containing the exact weight, which an English dispenser would regard as the only correct course. But then occurs a commercial trouble. The customer complains that the bottle is not full, and that in other pharmacies this has not been the case, and he gets the impression either that he is cheated or that a mistake has been made. Moreover, it may be mentioned that French bottles are really remarkable for their inaccuracy ; taking twelve bottles marked 180 grammes, perhaps one in the twelve on weighing will be found accurate, the others differing from 5 to 20 grammes.

Another example :—

Extrait de quinquina	1 gramme
Cognac	2 „
Julep gommeux	130 „

This mixture has been sent out both in 4-ounce and 5-ounce bottles. Many dispensers take the precaution to note the exact size of bottle in the prescription-book, so as to secure uniformity. Mixtures containing tinctures or other liquids in the quantity of 1 gramme, or even 2 grammes, are another fruitful source

of discrepancies, as practically so small a dose cannot be weighed accurately into a 6-ounce or 8-ounce bottle on the counter-scales. The Codex offers some assistance with a table showing the numbers of drops contained in 1 gramme of such preparations as are most frequently prescribed; but this is not of practical service, as accurate measurement of drops involves a great loss of time. In this table the number of drops to a gramme varies from 20 of distilled water to 93 of sulphuric ether. The dispenser very soon falls into the usual system of adding these ingredients more or less 'à l'œil.'

Whilst on the subject of mixtures we note the absence in French prescriptions of a safeguard which often prevents mistakes in England. In the majority of cases French prescribers give no directions on the prescription as to how the medicine is to be taken. When given the directions are not infrequently shamefully vague. 'Take by spoonfuls' occurs constantly, without indication whether tea, dessert, or table spoons are intended.

Suppositories also give rise to many uncertainties. The standard weight, according to the Codex, should be 3 grams for adults and 2 grams for children:—

Cocoa-butter	3	grammes
Ext. of opium	0·03	„
Ext. of belladonna	0·01	„
Camphor	0·30	„

To make one suppository.

Moulds as used in England are rare in France, their place being roughly supplied by extemporaneous paper cones, which require some practice and dexterity to produce of the same size, so as to obtain suppositories of uniform length and diameter. It is almost certain that no two pharmacies will turn them out in identical style. Suppositories before delivery to the customer are always covered with tinfoil—for what purpose it is difficult to say, as the patient has the trouble of unwrapping each one before using.

Powders, as a rule, are dispensed in as small a compass as possible, and many pharmaciens use powder-papers already folded, with their name and address thereon. This system offers the advantage of uniformity and neatness, not always obtainable by handwork. The papers are made both in ordinary and in waxed paper, the latter being employed for iodide and bromide of sodium and other deliquescent salts, which are frequently prescribed as powders. The following is an ordinary prescription for powders :—

Calcined magnesia	0'20	gramme
Subnitrate of bismuth	0'20	„
Pancreatin	0'10	„
Pepsin	0'10	„
Prepared chalk	0'15	„
Opium	0'01	„

For one powder. Send twenty such.

The price usually charged would be 2s. 6d. Powders are often prescribed in bulk, as the following :—

Carbonate of iron	10	grammes
Peruvian bark	15	„
Myrrh	15	„
Liquorice.	15	„

To be taken by teaspoonfuls.

These are usually dispensed in cardboard boxes, very seldom in wide-mouth bottles, unless at the special request of the customer.

Drops offer no feature of special interest, as they do not appear to be a popular form of prescribing, and are almost confined to arsenical preparations and such tinctures as nux vomica, ignatia, &c. These are generally dispensed in stoppered bottles fitted with a capillary tube, or stoppers with a groove and lip, or, when it is a question of price, in an ordinary phial, with a separate drop tube, at a cheap rate. Collutoires, or applications for brushing out the throat or mouth, usually have as a basis mulberry syrup, honey of roses, or glycerin, with about 10 per cent. of some active ingredient, such as potassium chlorate, borax, &c. The quantity usually ordered

is about 1 fluid ounce, which is sent out in a wide-mouth phial sufficiently large to admit a camel-hair brush.

The dispensing of ointments differs little from English procedure, and the formulæ do not, as a rule, present any novel features. Lard as a basis is becoming discarded for vaseline and lanoline. The preparations most in use are mercury, iodine, and zinc. Turpeth mineral occurs as an ointment of 1 part in 30; also sulphate of copper. Ung. belladonnæ is a great favourite with French prescribers, and occurs in all sorts of combinations, such as the following:—

Ext. bellad.	. . . . .	1 gramme
Ext. opii .	. . . . .	1 „
Ol. menth. pip.	. . . . .	5 gtt.
Adipis glycerinat.	. . . . .	20 grammes

The English style of covered pots for ointments is not common in France, and ointments are usually sent out in gallipots covered with tinfoil and paper or circular discs of cardboard. Recently screw-capped jars with nickel covers have found a place on the dispensing-counter, and from their convenience and low price will soon supersede the antiquated style of package.

Syrups form the real foundation of French pharmacy. The Codex gives the formulæ of 51, all more or less in daily use, and the non-official may be reckoned at some 600, all of which occur more or less in prescriptions. Sirop de limaille de fer (syrup of iron filings) is a specimen of the more unusual ones. Here, again, discrepancies occur. The instructions of the Codex are seldom followed, as most pharmaciens prepare even the official syrups from fluid extracts. The products differ widely from the original type, especially as the admixture is frequently made, from economical motives, to avoid keeping stocks of perishable preparations. In fact, the dispensing of syrups in France is exactly parallel with that of infusions in England. It is certain, however, that this system of dispensing has told against the pharmacien; many physicians prefer to prescribe the syrups of well-known specialists—such as Laroze, Chassaing, &c.—rather than risk the home-made combina-

tions of the dispenser. Prescriptions for specialities simply are becoming more and more common. For instance, the following :—

- One bottle digitalin (Homolle), 1 granule every two days.
- One bottle eau Gazost, as directed.
- One tin meat powder (Rousseau), a teaspoonful twice a day.
- One tube quassin (Burgraeve), one granule at each meal.

In this case nothing is left to the skill of the dispenser, and his loss of profit is very considerable. It is probable, however, that much of this has been brought about by bad work. Glucose frequently forms an important item in syrup dispensing.

Cachets are exceedingly popular in France—the home of their origin. Patients like them, and they afford a good profit to the chemist. Various makes of apparatus for filling and closing the cachets are now obtainable. The following translation of a prescription gives an idea of the French cachet :—

Pancreatin	.	.	.	.	.	0·25 centigr.
Maltin	.	.	.	.	.	0·25 „
Bismuth ..	.	.	.	.	.	0·25 „
Prepared chalk	.	.	.	.	.	0·25 „

For one cachet. Send twenty.

The price would be 5s. Cachets are sent out in cardboard cylindrical cases of different diameters, according to size, from 0 to 3, containing from five to twenty. For the exhibition of powders, salts of quinine, &c., nothing can be better adapted than this plan, which has in many instances replaced the use of pills and powders. Cachets of quinine, bismuth, rhubarb, and other popular remedies are very generally kept ready prepared. Extracts are also prescribed in this form, as in the following formula :—

Ext. cinchonæ	.	.	.	.	.	0·15 gramme
Quininæ bromid.	.	.	.	.	.	0·10 „
Sodii salicyl.	.	.	.	.	.	0·15 „

Make one cachet.

It is customary to mark on the prescription the size of the cachet employed, so as to secure uniformity.

Liniments are now generally dispensed in blue glass bottles with distinctive red labels. The formulæ for liniments at times are very curious, as will be seen from the following :—

Tinct. digitalis.	. . . . .	15 grammes
Tinct. scillæ .	. . . . .	15 „
Tinct. scammon.	. . . . .	15 „
Aq. lavand. .	. . . . .	300 „
Quin. sulph. .	. . . . .	2 „
Ol. hyoscyami.	. . . . .	200 „
Camphor. .	. . . . .	4 „
Tr. opii (Rousseau) .	. . . . .	4 „
Ext. belladon. .	. . . . .	4 „
Chloroform. .	. . . . .	4 „

Ft. lin.

The most frequently prescribed liniments are baume opodeldoc (similar to Steer's), baume tranquille, and baume fioraventi in conjunction with sedatives.

Pills are going out of fashion in France, aperients being very seldom ordered in this form, nor can special pills be said to have any really popular demand. Natural mineral waters have superseded pills, much to the dispenser's loss ; cheap screw-capped pill-tubes have taken the place of the old paper box, and are much adopted by specialists ; turned wood boxes appear never to have been worth making by French sundriesmen, the few met with being evidently of English origin. Some of the pill formulæ are surprising, and being frequently without any directions for taking are certainly trying to the nerves of the dispenser, *e.g.* :—

Atropinæ	5 milligrammes
Conf. rosæ	q.s.

Fiant pilulæ quinque.

Another :—

Veratrine	5 centigrammes
Opium	5 „

Make a pill, and send 30.

In this case, as the prescriber could not be consulted, the quantity of veratrine was changed from 5 centigrammes to $\frac{1}{2}$ centigramme.

Quassin crystal	.	.	.	.	2 milligrammes
Strychnine	.	.	.	.	$\frac{1}{2}$ „
Sulphate of quinine	.	.	.	.	25 „

Make a pill, and send 6.

Ext. cinchonæ	.	.	.	.	10 milligrammes
Ferri lactatis	.	.	.	.	3 „
Ferri et sodæ pyrophosph.	.	.	.	.	2 „
P. ergotæ	.	.	.	.	2 „

Fiat pilula. Mitte L.

The time and care required for such preparations are never compensated by the price charged. As a powder for rolling pills lycopodium is almost always employed, except when the pills are directed to be sent in orris or cinnamon powder, which happens occasionally. Silvering is becoming a thing of the past.

Wines are a favourite form of administration, and are usually prescribed by bottle or half-bottle; but in this case, as in so many others, proprietary articles are preferred. As examples of wines prescribed take the following :—

Vin de quinquinæ au Malaga, containing in every 100 grammes 10 drops tinct. nucis vomicæ, send $\frac{1}{2}$ litre.

Vin. cinchonæ	.	.	.	.	.	1 litre
Ferri et sodæ pyrophosph.	.	.	.	.	.	2 grammes

These are usually dispensed in special-shaped bottles and capsuled.

Mélange is a word frequently employed to head the label of a preparation, and it is somewhat difficult to define, as the following specimens will show :—

I.						Grammes
Old rum	.	.	.	.	.	150
Creosote	.	.	.	.	.	5
Glycerin	.	.	.	.	.	20

Mix.

II.						
Honey	.	.	.	.	.	15
Extract of arnica-flowers.	.	.	.	.	.	15

Mix.

III.

Iodoform.	.	.	.	.	.	.	.	I
Aq. rosæ	.	.	.	.	.	.	.	50
Aq. destil.	.	.	.	.	.	.	.	50
Tinct. opii	.	.	.	.	.	.	.	I

M.

Occasionally such prescriptions as the following crop up :— Sulphate of magnesia, rose-leaves, sarsaparilla, fumitory, china-root, liquorice-root, agaric (*Boletus laricis*), senna, and soap-wort, of each 1 ounce ; infuse for twenty-four hours in 4 litres of boiling water. This involves thoroughly cutting up or disintegrating the whole of the materials, so as to produce as uniform a compound as possible. The price charged would be 5s. The species would be dispensed either in a paper bag or in a cardboard box, according to circumstances. Packets of different preparations for infusions are frequently ordered, besides tisanes, or teas, to be drunk between the medicinal doses. Here is an example :—Quassia, 16 grammes ; roasted coffee, 32 grammes. Divide into eight packets as directed.

French prescriptions are even more difficult to read than German. We give a few examples with English translations. It will be seen that familiarity with the French language is absolutely essential, as the language of the prescriptions is French.

Tart. émétique 25 centigr
Diviser en paquets égaux n° 2

13 10he 90

J. Borra

Translation.

Tartar emetic 25 centigrammes

Divide into two equal packets.

℞ huile de foie de morue $\frac{1}{2}$ litre
 prendre une cuillerée à soupe
 au commencement de chaque repas

℞ Eau boriquée à 3% - $\frac{1}{2}$ litre
 allonger avec deux tiers d'eau tiède
 pour injections auriculaires

Une petite seringue en verre.

9/10 90

A. filiaz

Translation.

℞ Cod-liver oil $\frac{1}{2}$ litre

A tablespoonful to be taken at the commencement of each meal.

℞ Boric-acid solution in water 3% . . . $\frac{1}{2}$ litre

To be mixed with two-thirds as much warm water for aural injections.

A small glass syringe.

Rx

Calomel a' la vapeur

1 gr

en 10 paquets de 0,10.
Centgr

1 boîte papier Rigollot

Miel

100 gr

Miel 179^{he} = 90.

J. Lefebvre


Translation.

℞ Calomel prepared by sublimation. . . 1 gramme

Divide into 10 packets of 10 centigrammes|each.

1 box papier Rigollot [mustard-leaves].

Honey 100 grammes

Bromure de potassium
 Ext d q q 3 g
 Sir de o A 4 g
 Vin Malaga 100 g
 1 c à 1 chq 2h


As written.

Bromure de potassium . . . 3 g.
 Ext d q q . . . 4 g.
 Sir de o A . . . 100 g.
 Vin Malaga . . . 100 g.
 1 c à s chaq 2h.

In full.

Bromure de potas-
 sium . . . 3 grammes
 Extrait de quinquina 4 grammes
 Sirop d'écorces
 d'oranges amères 100 grammes
 Vin Malaga . . . 100 grammes
 1 cuillerée à soupe chaque 2
 heures.

du Dr. Leben salicylé -
Phenol ~~salicylé~~ en flacon

pour usage externe -
une cuiller à soupe pour une
250 gr eau - usage externe

Erntum d'isch 20g
pour usage externe -

Phenol de Valler NO 100 -

Seus le matras d'eau
le soir avant le sommeil 20g

Eau de toilette à 50g
une cuiller à soupe de matras à l'usage
Mile 19 Mars 1881.

O. M. Chaudat
68296

Translation.

Phenol salicylé du Dr. Leben.

Send one bottle.

For external use.

A tablespoonful for 250 grammes of water—external use.

Tincture of iodine 20 grammes

For external use.

[Tincture of iodine of the French Codex is a solution of 10 parts of iodine in 90 parts by weight of 95-per-cent. (v/v) alcohol.]

Vallet's pills No. 100

Two to be taken in the morning and two in the evening before the principal meal.

Seidlitz water 50 grammes

One bottle to be taken in the morning before food (fasting).

[One bottle containing 50 grammes seidlitz salt (mag. sulph.), charged with CO₂ made by adding a little citric acid and sodium bicarbonate and taking quickly.]

3 Sulfate de quinine 1 ^{grain}
Eau gommée 80 ^{grs}
Sirop fleurs d'oranges 20 ^{grs}
Sirop d'acoust 25 ^{grs}

Help for protection:
 guide for millions

J. J. Garrison

Translation.

R _x Quinine sulphate	.	.	.	.	1 gramme
Gum water	.	.	.	.	80 grammes [about 2%]
Syrup of orange-flowers	.	.	.	20	„ [Codex]
Syrup of aconite	.	.	.	25	„ „

Mix according to art.

Mixture to be taken by spoonfuls [tablespoonfuls].

Docteur TOURNAY

2, Boulevard St-Martin

Paris. M. 20 X ^{he} 1905

LUNEN — STROUBEN — VERNES

de 2 h. à 4 h.

Téléphone n° 439-79

Prendre matin et soir,
un des cachets suivants =

1077506 { Thiocol — 0.60 centigr.
Glycérophosphate de Chaux — 0.50 centigr.
Cacodylate de Soude — 0.02 centigr.
Poudre Noix Vomique — 0.01 centigr.

V. un cachet — 2^e Jo.

1/ Capsules Friant — 4^e ff.
2 pilules au milieu, ou à la
fin des 2 principaux repas.

F. Tournay

Badigeonnages de Teinture d'Iode
sur la Cite' d'abord, alternativement
sur avant et en arrière —

APPROBES L'ORDONNANCE

Transcription.

Prendre matin et soir un des
cachets suivants:—

Thiocol . . . 0.60 centigr.

Glycérophosphate
de Chaux . . . 0.50 centigr.Cacodylate de
Soude . . . 0.02 centigr.Poudre Noix
Vomique . . . 0.01 centigr.

pr. un cachet. No. 30.

Capsules Friant un flacon. 2
pilules au milieu, ou à la fin des
2 principaux repas.

F. TOURNAY.

Badigeonnages de teinture d'Iode
sur le côté droit alternativement en
avant et en arrière.

Translation.

Take morning and evening one
of the following cachets:—

Thiocol . . 0.60 centigrammes

Glycerophos-
phate of

calcium . . 0.50 centigrammes

Cacodylate

of soda . . 0.02 centigrammes

Powdered nux

vomica . . 0.01 centigramme

For one cachet. No. 30.

Friant's capsules one bottle;
two pills in the middle or at the
end of [midway between or im-
mediately after] the two principal
meals.

Apply tincture of iodine to the
right side in front and behind
alternately.

*Donner un lavement à
l'Eau boricuée — Après que
l'enfant l'aura rendu — lui
donner au moyen d'une poire —
le lavement suivant =*

*Eau 30 gram
Sulfate de quinine 0.20 centigr.
Eau de Rabel . . q.s. pour dissoudre
F. s. a.*

Transcription.

Donner un lavement à l'Eau
boriquée—Après que l'enfant l'aura
rendu—lui donner au moyen d'une
poire—le lavement suivant:—

Eau 30 gram.

Sulfate de quinine 0.20 centigr.

Eau de Rabel . . q.s. pour dis-
soudre

F. s. a. [Faites selon art].

Translation.

Give an enema of boric acid
solution; after the child has dis-
charged it, give—by means of a
pear-shaped syringe—the following
injection:—

Water 30 grammes

Sulphate of

quinine 20 centi-

grammes

Rabel's solution enough to dis-
solve

Make according to art.

Alcohol \bar{a} 96° ————— 200 gr
 Alcohol camphor (22) 30 gr
 Coal tar saponin —————
 Eau distillée — 30 gr
 Nitrate of potassium — 1.50 gr
 Nitrate of pilocarpine 0.70 gr
 Bichloride Hg — 0.20 gr
 Extraite de violettes 4 gr

17 mai 99.

/abouman

Translation.

Alcohol (96 per cent.)	. . . . .	200	grammes
Spirit of camphor,			
Coal tar saponin (liq. carb. deterg.)			
of each	. . . . .	30	grammes
Distilled water	. . . . .	30	grammes
Nitrate of potassium	. . . . .	1.50	gramme
Nitrate of pilocarpine	. . . . .	0.70	gramme
Bichloride of mercury	. . . . .	0.20	gramme
Extrait of violets	. . . . .	4	grammes

The following is an Italian prescription:—

Unguento semi freddo
 Ossido di zinco 40
 Acido tannico 4
 Fiori solfo 3
 Essenza menta
 Q. S. ad IV
 M. us ext
 Bonaldi

Transcription.

Unguento semi freddi	gram. 40
Ossido di zinco	gram. 4
Acido tannico	gram. 4
Fiori solfo	gram. 3
Essenza menta	gocce numero iv.

Mescolare. Uso esternamente.

Translation.

Cold cream	40 grammes
Oxide of zinc	4 grammes
Tannic acid	4 grammes
Flowers of sulphur	3 grammes
Oil of peppermint	4 drops

Mix. For external use.

FOREIGN EXPERIENCE FOR ASSISTANTS

It is now becoming a regular custom with English assistants, at least to the number of about a hundred, yearly to go to the South of France for the winter season, and many later on endeavour to get into a Parisian pharmacy. In the former case the duties of the English-speaking assistant are generally confined to attending American and English customers, and dispensing their prescriptions. The following is a brief description of the duties by an assistant who went to the Riviera for a season :—

Our pharmacy is large and well-arranged ; the *garçons* do all the dusting and look after the place from about 6 till 8 in the morning, when we make our appearance. ‘We’ includes a German, a Swiss, and myself. I attend to the English and Americans, and they see to the others. Each alternate Sunday I am on duty all day, except three hours for meals. On week-days we are on duty alternately till 7 and 10, or half-past 9. We have an hour and a half for lunch at 12 o’clock, and the same for dinner at 7. We sleep in, but board out, and many of us go to the same restaurant, where, for 90*f.* a month, we eat, drink, and make merry. English patent medicines are greatly in evidence. We have separate English labels for many of our specialities, and of course for dispensing ; in fact, we have so many English things about on the counter and elsewhere that our customers remark on its being quite like an English chemist’s shop. Oxygen is in great demand for chest and throat troubles. We make it from potassium chlorate and manganese, store it in a small gasometer, and retail it in indiarubber bags. We have English weights and scales and measures, and, in fact, everything there should be in a well-appointed pharmacy. Prices are very good, especially for dispensing.

This sort of practice initiates the English assistant thoroughly into French methods, he gets his French brushed up, and then if he require a better insight into French pharmacy he may endeavour to get into an establishment which is pure French, or where he will have a share of all the dispensing done. The experience is worth getting, especially as a finish-off to pharmaceutical studies, and after experience in a good English, Irish, or Scotch dispensing house.

NEW AND UNOFFICIAL REMEDIES.

ARTICLES which are in the British Pharmacopœia are not included in this chapter, but many remedies are mentioned which are rarely heard of, and this is done because they are the very things that dispensers have difficulty in learning anything about when wanted.

Abanon.—A magnesium phosphotartarate; a white and tasteless powder, slowly soluble in water. Dose: \mathfrak{zj} . to \mathfrak{zss} . as an aperient.

Acetal is ethylenediethyl ether $[\text{CH}_3\cdot\text{CH}(\text{OC}_2\text{H}_5)_2]$, a colourless fluid given in doses of \mathfrak{ziss} . to \mathfrak{ziv} . (emulsified with gum acacia) as a hypnotic in place of chloral hydrate. A mentholised ethereal eau de Cologne for headache is also called 'Acetal' in Germany.

Acetatoxyl. — Acetyl - atoxyl (sodium para-aminophenyl arsenate, or sodium arsanilate). Used in sleeping-sickness in doses of $\frac{1}{2}$ to 3 grains by subcutaneous injection.

Acetocaustin.—Trade-name for trichloroacetic acid, *q.v.*

Aceto-morphine.—Trade-name for diacetyl morphine, known also as heroine.

Acetonal is a solution of 82 parts of sodium acetate in 4,050 parts of liq. alumini acetici, P.G.

Acetopyrin, antipyrin aceto-salicylate, or pyrosal, is a feebly water-soluble compound, given in doses of 5 to 15 grains as an anti-

pyretic and analgesic in rheumatism, neuralgia, and sick headache.

Acetozone, or benzozone, is benzoyl-acetyl-peroxide. Occurs in white crystals, slightly soluble in water. Used externally as an antiseptic lotion (10 grains to a pint of water, filtered), and internally in doses of 3 to 5 grains, mixed with as much milk sugar and administered in capsules. In commerce, acetozone is supplied mixed with an equal weight of inert powder to prevent decomposition, hence the necessity for filtering solutions.

Acid, Agaric, or agaricin, the active principle of white agaric, occurs in white, silky crystals or in crystalline powder. It is given to check the night-sweats of consumptives. Dose: $\frac{1}{8}$ to $\frac{1}{2}$ grain, in pill, three hours before bedtime, frequently combined with Dover's powder.

Acid, Arsino-salicylic. — Recommended as a substitute for atoxyl. In colourless needles, readily soluble in warm water and in alcohol. Dose, like atoxyl.

Acid, Cacodylic. — Dimethyl arsenic acid [$\text{As}(\text{CH}_3)_2\text{O.OH}$], in inodorous, rhombic crystals, soluble in water and in alcohol. Used chiefly in the form of *sodium cacodylate*, which is a white, amorphous powder, for the treatment of psoriasis. Enormous doses of arsenic may thus be administered without toxic symptoms. The doses are $\frac{1}{4}$ to 1 grain in pill, or by hypodermic injection. It is also given *per ano*. The solutions require a preservative (carbolic acid or thymol), and should be made with distilled water.

Acid, Camphoric. — Crystalline scales, soluble in alcohol, slightly in oils, almost insoluble in water. Has antiseptic properties and is used internally in 10 to 30 grain doses (as powders) for night-sweats, bronchitis, cystitis, diarrhoea, and gonorrhoea. Also used as a bladder-wash in cystitis, ʒij . dissolved in rectified spirit ʒj . and water ʒix .

Acid, Cathartic. — One of the active principles of senna. A brownish powder. Laxative dose: For children, $1\frac{1}{2}$ to 3 grains; for adults, 4 to 8 grains.

Acid, Cinnamic. — Properties similar to benzoic acid. Recommended in tuberculosis as an intravenous injection, beginning with $\frac{1}{4}$ -grain doses in almond or olive oil. See also *Hetol*.

Acid, Coumaric, or ortho-hydroxycinnamic acid, is prepared from coumarin. Sodium orthocoumarate has been used as a 22-per-cent. aqueous solution for tuberculosis. Tylmarin (Martindale) is

acetyl-ortho-coumaric acid, and is similarly used.

Acid, Cresotic (Para). — Antipyretic and intestinal antiseptic for children, resembling salicylic acid in appearance and properties. Dose: As antiseptic, $\frac{1}{4}$ to 1 grain; as antipyretic, 2 grains upwards.

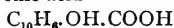
Acid, Filicic. — The active principle of male fern, and given as an anthelmintic in powders of 10 grains or more.

Acid, Formic (H.CO.OH). — Prepared from oxalic acid and glycerin. A colourless pungent liquid, which exists naturally in nettles, also in ants (hence its name). A 25-per-cent. solution is used, in doses of 2 to 10 minims, as a muscular tonic. Formates of sodium, calcium, potassium, lithium, magnesium, and iron are used similarly, in doses of $\frac{1}{6}$ to 3 grains. Strychnine formate is also used; dose, $\frac{1}{50}$ grain. The formates are all soluble in water, and are best given in solution. Cachets or powders are unsuitable owing to their deliquescence.

Acid, Gynocardic. — This is the name applied up to June, 1904, to a mixture of the fatty acids of chaulmoogra oil which has been administered in leprosy, rheumatism, syphilis, and tuberculosis in doses beginning at $\frac{1}{2}$ grain and increasing to 3 grains. Also used externally, dissolved in an oil or fat (strength 10 per cent.). As chaulmoogra oil is not obtained from the seeds of *Gynocardia odorata*, the name is a misnomer, and chaulmoogric acid is a distinct product.

Acid, Osmic.—In yellow crystals, soluble in water. Given in doses of $\frac{1}{64}$ grain for muscular rheumatism and neuralgia, and hypodermically in $\frac{1}{20}$ -grain doses for sciatica and tumours. The vapour is intensely irritating.

Acid, Oxynaphthoic, or naphtholcarbonic acid—



—is a nearly white powder, practically insoluble in water, but soluble on the addition of alkalis, which form salts with it. The acid is easily soluble in alcohol and ether. Is an antiseptic and antizymotic in doses of $1\frac{1}{2}$ to 3 grains. Also used as a 1-in-20 ointment (with lanoline or vaseline) for itch.

Acid, Phenolsulphonic (sozolic acid), $\text{C}_6\text{H}_2\text{I}_2 : \text{OH}\cdot\text{SO}_3\text{H}\cdot 3\text{H}_2\text{O}$, occurs in needle-shaped crystals, easily soluble in water and alcohol. The 2 to 3 per cent. solution in water is used as an antiseptic. See also *Aseptol*.

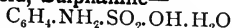
Acid, Picric.—A yellow crystalline powder, with bitter taste. Soluble in water (1 in 95) and in alcohol (1 in 10). An explosive substance. For malaria in $\frac{1}{2}$ to 2 grain doses (in alcohol), and 1-in-1,000 solution for burns, eczema, and cracked nipples.

Acid, Santonic, a white, crystalline principle ($\text{C}_{15}\text{H}_{20}\text{O}_4$), the sodium salt of which is used for intestinal worms. Dose : 1 to 5 grains.

Acid, Sclerotinic.—One of the active principles of ergot. Occurs as a brown powder, soluble in water. Given by mouth or hypodermically in $\frac{1}{2}$ to 1 grain doses in

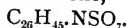
epilepsy, and as a hæmostatic. There are two kinds, Dragendorff's and Podwyssotski's, but they appear to be closely alike.

Acid, Sulphanilic—



—a white, crystalline substance used in chronic catarrhs. Dose : 5 to 15 grains dissolved in water by the aid of sodium bicarbonate. The sodium salt is in consequence generally used.

Acid, Taurocholic,



—In yellowish, crystalline masses, soluble in water and alcohol. Has antiseptic properties.

Acid, Trichloracetic (CCl_3COOH), occurs in deliquescent crystals. It is used as a caustic, chiefly in venereal affections.

Acid, Vanadic (V_2O_5), and sodium meta-vanadate are powerful therapeutic agents equalling arsenic in potency. The dose is gr. $\frac{1}{32}$, or by subcutaneous injection gr. $\frac{1}{150}$. Given in chlorosis, rheumatism, and tuberculosis, chiefly as a tonic or appetiser. Meta-vanadic acid (HVO_3) and its sodium salt are powerful oxidisers, and are used for application to ulcers, and internally in tuberculosis.

Acidol (betaine hydrochloride) occurs in white crystals, soluble in water. Given in gastric affections. Dose : 5 to 15 grains.

Acitrin. — Phenyl - cinchonic ethyl ester, a yellow powder. Given in 8-grain doses for gout, sciatica, and nerve-pains.

Acoin (alkyloxyphenylguanine) is a local anæsthetic recommended in place of cocaine, the

duration of the anæsthesia being proportionate to the strength of the solution; thus 1 in 1,000 produces anæsthesia of the cornea lasting fifteen minutes, 1 in 200 one hour, and 1 in 40 one day. It is soluble in water. The best solution to use is acon 1 grain, sodium chloride 8 grains, and sterilised water 18 drachms.

Actol.—The fancy name for lactate of silver. A white powder soluble 1 in 15 of water. Is an active bactericide, and is used chiefly in laryngeal affections (gargle or insufflation). Dose: $\frac{1}{8}$ grain to begin.

Adamon, or borneol dibromodihydro cinnamate, is a white crystalline powder, soluble in ether and chloroform, but insoluble in water. Dose: 8 grains as a hypnotic.

Adepsine.—Trade-name for soft paraffin.

Adonidin.—The glucoside of *Adonis vernalis*. An amorphous, brown powder, soluble in water. Dose: $\frac{1}{4}$ grain, and not more than $1\frac{1}{2}$ grain daily.

Adrenochrome.—A proprietary (Berlin) sulphur compound of the suprarenal principle. Employed internally in gout and skin-affections.

Adreucaine.—A combination of eucaine and adrenalin for local anæsthesia.

Æsculin.—A glucoside obtained from the horse-chestnut. Soluble in water with the aid of 2-per-cent. sodium carbonate. The solution is used in conjunction with Finsen light treatment.

Æthacol, also called ajacol, guethol, and thanatol, is the monoethyl ester of pyrocatechin (*i.e.*, ethyl guaiacol, $C_6H_4.OC_2H_5.OH$), and is an oily aromatic substance, given in doses of 4 to 8 grains as a remedy for tuberculosis. It is best administered in capsules or as pills.

Æthol is cetyl alcohol extracted from spermaceti. It is a pulverulent substance, and is used in dermatology—*e.g.*, in combination with boric acid (1 to 1 and 1 to 5)—as a dusting-powder (borsyl).

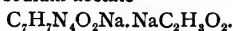
Aethrisin.—Acetylsalicylamide. Used in articular rheumatism. Dose: 5 to 10 grains.

Afermol.—Dried serum of horse blood. Used as a dusting-powder for wounds, alone or mixed with a fourth of its weight of substitol.

Agaricin Phenetidide is a combination of agaric acid with parphenetidine. There are two forms of it, the *monophenetidide* (silver-grey scales) and *diphenetidide* (greenish-grey needles).

Agathin.—This is the trade-name for salicylalphamethylphenylhydrazine. Occurs as a colourless, inodorous, and tasteless powder or in scales, insoluble in water. Used for neuralgia, sciatica, and similar affections in 3 to 8 grain doses.

Agurin is the commercial name of a double salt of sodio-theobromine and sodium acetate—



The salt (freely soluble in water), in doses of 4 to 8 grains in peppermint-water, is given as a diuretic, and is specially useful in sciatica.

Airol is bismuth oxyiodogallate, and is used as a substitute for iodoform externally, as an antiseptic astringent internally for gonorrhœa and bowel-troubles, in 2 to 5 grain doses. The preparations are: dusting-powder 1 to 5, bougies and glycerin-injection 1 in 10.

Albargin, a tasteless, sandlike powder obtained by the interaction of gelatin and silver nitrate. Contains 15 per cent. of silver, and the solution (1 or 2 per 1,000) is used as an injection in gonorrhœa.

Aletodin.—Squire's name for acetyl-salicylic acid.

Alexipon.—Ethyl acetyl-salicylate. An antirheumatic resembling acetyl-salicylic acid. Dose: 5 to 15 grains.

Alformin.—A solution containing 16 per cent. of aluminium formate.

Alginoids are compounds of alginic acid (obtained from seaweed) and bases, introduced by the late Mr. E. C. C. Stanford. The more important are the compounds with arsenic and iron. They pass the stomach unattacked, but in the intestines give the active agent to the circulation. Iron alginate has proved to be advantageous in anæmia, especially where there is gastric disturbance. It contains 11 per cent. of iron, and is given in doses of 2 to 15 grains.

Allosan.—Santalol allophanate; in tasteless crystals. Dose: 5 to 15 grains as a urethral and bladder antiseptic. Insoluble in water; soluble in alcohol.

Almatein.—A compound of hæmatoxylin and formaldehyde, used

as an iodoform substitute and internally as an intestinal antiseptic.

Alphogen, or **Alphozone**.—An acid substance (succinic peroxide) used in 1-to-1,000 solution (water) as a germicide and deodorant; also as an ointment (2 per cent.) and a dusting-powder (5 per cent.).

Alphol.—The salicylate of alpha-naphthol, a white, crystalline compound resembling salol in appearance and properties. Dose: 8 to 16 grains (as powders) in cystitis, articular rheumatism, and neuralgia.

Alsol is the trade-name for aluminium aceto-tartrate, used in 1 to 3 per cent. solutions as an antiseptic for indolent sores.

Althein, or **Asparagin**.—A crystalline substance obtained from asparagus, liquorice, marshmallow, and other roots. Slightly soluble in water. Dose, as a diuretic: 1 to 2 grains.

Alumnol.—A white powder (aluminium naphthol-sulphonate), readily soluble in water. Used in venereal complaints, and as a gargle or spray for the throat, the solutions employed varying in strength from 2 to 16 grains per ounce.

Alypin.—A local anæsthetic (Bayer), benzoyl-tetramethyl-diamino-ethyl-dimethyl carbinol hydrochloride. A crystalline powder, very soluble in water. The solution may be sterilised by boiling without injury. Used chiefly for eye-work in 2-per-cent. solutions; also for lumbar anæsthesia, 0.25 to 1 c.c. of 2-per-cent. solution. Internal dose: $\frac{1}{20}$ to $\frac{1}{2}$ grain. *Alypin nitrate* should be used with silver-nitrate solutions.

Amenyl.—Methyl-hydrastimide hydrochloride. Pale-yellow needles, soluble in hot water and in alcohol. An emmenagogue given in doses of $\frac{3}{4}$ to $1\frac{1}{2}$ grain daily, in conjunction with aloin if constipation is present.

Ammonol.—A mixture of acetanilide (50 per cent.) with sodium bicarbonate and ammonium carbonate.

Amphotropin is hexamethylene-tetramine camphorate, and is used as a bladder antiseptic in the same doses as hexamine.

Amygdophenin.—A crystalline derivative of paramidophenol; is sparingly soluble in water, and is given in 8 to 15 grain doses in rheumatic fever.

Amylene Hydrate.—This is a colourless, oily liquid, with a slightly camphoraceous odour; soluble in 8 parts of water, and in alcohol, ether, and glycerin. Hypnotic in doses of ʒss. to ʒj. May be administered in gelatin capsules, each containing 15 minims, or as a mixture.

Amyloform is the name given to a German antiseptic dusting-powder prepared by the action of formic aldehyde on starch.

Amyloiodoform is similar to the last-named preparation, but iodine also enters into it.

Anæsthesin (para-amido benzoic ethyl ester), $\text{C}_6\text{H}_5\cdot\text{NH}_2\cdot\text{COOC}_2\text{H}_5$, is a white, tasteless, and odourless powder, sparingly soluble in water, but easily soluble in alcohol, ether, acetone, chloroform, and oils. It has local anæsthetic and carmina-

tive properties, and is used in painful gastric disorders in doses of 5 to 8 grains twice daily, for coughs in $\frac{1}{4}$ to $\frac{1}{2}$ grain doses (preferably with glyco-gelatin or lozenge base), and for throat-affections as insufflations. Suppositories (5 to 10 grains) and ointment (10 per cent.) are also used.

Analgene—



—is a white, crystalline powder insoluble in water, possessing analgesic and antipyretic properties. Dose: 5 to 15 grains not oftener than six times daily. Used in acute rheumatism, lumbago, neuralgia, and as a substitute for quinine in malaria.

Analgesine.—This is one of several names given to antipyrin. Others are anodynin, methozine, parodyn, phenazone, phenylone, pyrazine, pyrazolone, and sedatin.

Anemonin.—The crystalline camphor of *Anemone Pulsatilla* and other species. Insoluble in water. Given in $\frac{1}{4}$ to $\frac{3}{4}$ grain doses (in pill) for asthma, bronchitis, and as an emmenagogue.

Anesin.—Trade-name for a 2-per-cent. solution of chloretone.

Anilipyrin is the name given to mixtures of antipyrin and acetanilide—viz., *alpha*, antipyrin 188 parts and acetanilide 135 parts, the *beta* kind having double the amount of antipyrin. The substances are melted together. Used in influenza, polyarthritis, and neuralgia, in $7\frac{1}{2}$ -grain doses.

Aniso-theobromine.—A combination of sodio-theobromine and

sodium anisate. Dose: 2 to 10 grains as a diuretic.

Annidalin is a synonym for aristol.

Antacetin. — An amorphous, white powder obtained by evaporating saccharated solution of lime to dryness. Dose: 15 to 30 grains for tapeworm.

Anthrabin is a synthetic product closely resembling chrysarobin, and recommended in place of it in the treatment of psoriasis, herpes, and other skin-diseases. Used either as an ointment or alcoholic solution, strength 1 or 2 in 20.

Anthrasol is a pale-yellow, oily fluid with a tarry odour. It is said to represent equal parts of coal tar and juniper tar. Used for skin-affections in combination with ointment-bases, skin-pastes, and spirituous soap solution. One in ten is the usual strength.

Antiarthrin. — Pills composed of horse-chestnut extract and a salicin derivative (German patent No. 111,963).

Antiformin. — A disinfectant solution containing about 7.5 per cent. of free sodium hydroxide and 5.3 per cent. of combined chlorine.

Antileprol. — The trade-name of a purified chaulmoogra oil, in $\frac{1}{2}$ and 1 grain capsules.

Antiluetic. — Potassio-ammonio antimonic bitartrate. An anti-syphilitic for hypodermic injection in 2.5-per-cent. solution, with the same proportion of cocaine hydrochloride. Dose: 1 to 2 c.c.

Antimellin. — A yellowish, crystalline powder of a glucosidal

nature, obtained from jambul-seeds. It should not be confused with a proprietary galenical preparation of the same name.

Antimonyl Aniline Tartrate. —

In white crystals, soluble in 7 parts of water. Recommended for the treatment of trypanosomiasis instead of the more toxic tartar emetic.

Antinervin. — An antipyretic and antirheumatic remedy, said to be a mixture of a bromide, acetanilide, and salicylic acid. Dose: $7\frac{1}{2}$ grains.

Antinosin. — A blue powder, with faint odour of iodine. It is the sodium salt of tetraiodophenolphthalein (nosophen). Soluble in water. Antiseptic; used in cystitis and vesical catarrh as an injection (gr. iv. per \mathfrak{zj} ., gradually strengthened to gr. x. per \mathfrak{zj} .).

Antiperiostin. — A 30-per-cent. solution of mercuric iodocantharidin. Used in veterinary practice for the treatment of windgalls, spavin, and other ailments.

Antipyonin, or sodium tetraborate. — Equal parts of borax and boric acid fused together.

Antipyrin Compounds. — The following are the doses of the chief compounds: *Acetyl-salicylate* (acopyrin), 5 to 15 grains; *Amygdalate* (tussol), 5 to 15 grains; *Caffeine-citrate*, $7\frac{1}{2}$ to 15 grains; *Chinopyrin*, 8 to 24 grains; *Hydrochloride*, 5 to 10 grains; *Iodopyrin*, 5 to 20 grains; *Monobromide* (bromopyrin), 5 to 20 grains; *Salicylate* (see *Salipyrin*).

Antirheumol. — A salicylic ester of glycerin, in white crystals, for rheumatism. Dose: 5 to 20 grains.

Antisclerosin. — Tablets of a mixture of sodium sulphate (0.04 gramme), sodium chloride (0.4), sodium phosphate (0.012), calcium glycerophosphate (0.012), sodium carbonate (0.016), and magnesium phosphate (0.016). Dose: Two tablets thrice a day for arteriosclerosis.

Antiseptin, or para-bromacetanilide ($C_6H_4.BrNH.COCH_3$), is used as an antiseptic externally, and as an antipyretic and sedative internally, the dose being $\frac{1}{4}$ to 1 grain (*with caution*).

Antiseptin (Zinc Bromo-thymolate) is a proprietary antiseptic stated to contain 85 parts of zinc sulphate, $2\frac{1}{2}$ parts each of thymol and zinc iodide, and 10 parts of boric acid.

Antiseptol (cinchonine iodo-sulphate) contains 50 per cent. of iodine, and is used externally as a substitute for iodoform, and internally as an antipyretic in doses of 1 to 5 grains.

Antispasmine. — A reddish, slightly hygroscopic powder, which is a mixture of sodium salicylate and narceine-sodium (narceine 50 per cent.). Is an antispasmodic and sedative used in whooping-cough and other spasmodic bronchial affections, the dose being $\frac{1}{8}$ grain for children under six months and 1 grain for those over three years.

Antithermin, or phenylhydrazinlevulinate, occurs in colourless, tasteless crystals, almost insoluble in water. Dose as an antipyretic and in pulmonary phthisis and Bright's disease, 3 grains thrice daily.

Anti-thyroidin, or antithyroid serum. — The serum of thyroidectomised animals, used in goitre.

Antituman. — Sodium chondritin-sulphonate, a constituent of the arterial walls and of cartilage; for cancer. Dose (by hypodermic injection): $1\frac{1}{2}$ grain.

Antitussin. — A proprietary ointment for whooping-cough, of which the active principle is difluorodiphenyl (5 per cent.).

Antyase. — A bacterial vaccine given hypodermically in doses of $\frac{1}{32}$ grain as a preventive of typhoid fever.

Anusol. — The name applied to proprietary suppositories for intestinal affections. See p. 195.

Anytin is the name given to a 33-per-cent. solution of ichthyol-sulphonate, from which *anytol* is made in two forms—viz., *metasol* (metacresol-anytol), a mixture of 2 parts of cresol and 3 parts of anytin; and *eucasol* (eucalyptol-anytol), a mixture of 1 part of eucalyptol and 3 parts of anytin. They are antiseptics.

Aperitol. — Iso-valeryl-acetylphenolphthalein. Laxative dose: 1 to 6 grains.

Aphrodine. — The trade-mark name for yohimbine.

Apiol. — A green, oily fluid, which is the active principle of parsley. Soluble in alcohol, but generally given in capsules (5 to 10 minims) as an emmenagogue, and in 15-minim doses for malaria. There is also a crystalline product called 'apiol,' which is the camphor ($C_{12}H_{14}O_4$) of parsley. It occurs in colourless needles, and has been used in doses

of 3 grains, dissolved in olive oil, for malaria and dysmenorrhœa.

Apocodeine Hydrochloride.—A derivative of codeine, in grey powder, hygroscopic and soluble in water. Used in whooping-cough, bronchitis, and similar affections. Dose: $\frac{1}{4}$ to 1 grain (or more) in pill; hypodermically, $\frac{1}{6}$ to $\frac{1}{2}$ grain. Also used hypodermically as a purgative in similar doses.

Apolsin (Alphacitrophen).—A greyish, crystalline powder, soluble 1 in 50 of water, the solution being acid in reaction. Resembles phenacetin in constitution and action, and is used as an analgesic and antipyretic in doses of 6 grains (as powders) every two hours, or 8 grains in suppository with cocoa-butter.

Apyrol.—Trade-name for a mixture of antipyrin (52) and quinine sulphate (48).

Argentamine.—An 8-per-cent. solution of silver phosphate in 15-per-cent. solution of ethylene diamine. Of this a 1-in-4,000 aqueous solution is used as an injection in gonorrhœa.

Argentamine - albumose.—Silver nitrate-ethylene-diamine albumose. Contains 7 per cent. of silver. Readily soluble in water, the solution having an alkaline reaction. Used in 1 grain to 3j. solution as an injection in gonorrhœa.

Argentol (Silver Chinoseptolate).—A yellow powder, used as an injection (1 in 1,000 of water) for venereal complaints, and in doses of 1 to 5 grains for epilepsy and sciatica.

Argonin.—A compound of casein and silver which occurs as a white powder and contains $4\frac{1}{4}$ per cent. of metallic silver. Bactericide, and used in 1 to 2 per cent. aqueous solution as an injection for gonorrhœa.

Arhovin.—A yellowish liquid, a compound of diphenylamine and thymol benzoic ethyl ester, used as an antigonorrhœic. Dose 4 minims.

Aristochin is a neutral carbonate of quinine, which is practically free from taste. Prescribed for children, and appears to have special utility in the treatment of malaria. Dose for the latter purpose, 5 to 15 grains.

Aristol, or dithymol diiodide, is a substitute for iodoform, and is used for the same purposes. It contains about 46 per cent. of iodine. It is a brownish, amorphous, and odourless powder. Used preferably in powder for old ulcers, and in 5 and 10 per cent. ointment (lanoline or vaseline basis heated very cautiously) for the treatment of eczema and ringworm.

Arrhenal (Disodium Methylarsenate) occurs in colourless crystals, rapidly soluble in water. Therapeutically it resembles sodium cacodylate or sodium dimethyl arsenate, and is given in doses of from $\frac{1}{4}$ to 1 grain.

Arsacetin.—Sodium para-acetyl-amino-phenylarsonate or sodium acetyl-arsanilate. A white, crystalline powder soluble 1 in 10 of cold water, and solutions can be boiled without decomposition. Employed in sleeping sickness (trypanosomiasis) and syphilis in doses of

9 grains hypodermically, and $1\frac{1}{2}$ to $7\frac{1}{2}$ grains in disorders of digestion, anæmia, and nervous troubles.

Arsamin.—Sodium para-amino-phenylarsonate or sodium arsanilate. Uses as the last. Dose : $\frac{3}{4}$ to 3 grains.

Arsan.—A combination of gli-dine and arsenic. A brown, amor-phous powder, marketed in $8\frac{1}{2}$ -grain tablets, each containing $\frac{1}{32}$ grain of arsenic.

Arsenium Bromide.—Deliques-cent crystals, given in doses of $\frac{1}{60}$ to $\frac{1}{16}$ grain for diabetes.

Arsenogen.—An iron com-pound containing phosphorus and arsenium, the latter being easily split off.

Arsentriferrol.—An aromatised solution of arsenogen and triferrin. Recommended as a tonic.

Arterenol.—A derivative of syn-thetic suprarenin, obtained by the reduction of amino-aceto-pyrocate-chin. The hydrochloride is crystal-line, and soluble in water. Used like suprarenin.

Arthrisin.—Acetyl-salicylic amide. Employed in articular rheumatism in the same doses as sodium salicylate.

Arylarsonates.—See *Kharsin*, *Orsudan*, and *Soamin*.

Asaprol, or *abristol*, is calcium betanaphthol - alphamonosulpho-nate, $(C_{10}H_6OHSO_3)_2Ca, 3H_2O$. It is a white or greyish powder, soluble in water and alcohol, and is recom-mended in 8 to 15 grain doses for articular rheumatism and enteric fever.

Aseptobilin.—A purified extract of bile, obtained from the ox

or pig, in 2-grain keratin-coated dragées.

Aseptol is a 33-per-cent. solution of orthophenol-sulphonic acid. As an antiseptic in 1 to 10 per cent. solutions, and internally in 10 to 20 grain doses.

Aseptolin is the trade-name of pilocarpine carbolate, a colourless, oily fluid. A solution containing 1 part in 5,000 parts of $2\frac{1}{2}$ -per-cent. aqueous carbolic-acid solution is used in malaria and tuberculosis. Dose of the solution, by subcutaneous injection, 1 drachm.

Asiphyl.—The mercuric salt of para-anilinarsonic acid.

Aspirin.—Bayer's name for acetyl-salicylic acid, B.P.

Aspirochyl.—Para-amino-phe-nyl mercuric arsenate. For syphilis.

Aspirophen is amido-acet-para-phenetidin acetyl-salicylate, a spar-ingly soluble, white powder, used like aspirin in 5 to 15 grain doses.

Asquirrol.—Dimethyl mercury containing 56 per cent. of mercury. Soluble in water. Issued in 1-c.c. ampoules for hypodermic use in syphilis.

Asterol is paraphenolsulphonate of mercury ; a white powder soluble in hot water, and used in 2 to 4 per cent. solutions as an antiseptic.

Astrolin.—Methylethylglycocol-licantipyrin, a colourless, crystalline powder, readily soluble in water. Dose : 8 to 15 grains in neuralgia and migraine.

Asurol.—A compound of mer-cury and sodium amido-oxy-iso-butyrate containing 40·3 per cent. of mercury. Soluble in water, and

intended to replace mercury salicylate in the treatment of syphilis.

Atoxyl. — Sodium arsanilate. Occurs as a white, crystalline, odourless and tasteless powder, soluble in water. Dose: $\frac{3}{4}$ to 3 grains, by subcutaneous injection.

Atroscine is a synonym for scopalamine, an isomer and optically inactive form of hyoscine. Dose: Same as hyoscine.

Azodermin. — Acetyl - amidoazotoluol. A yellowish-red powder used in 10-per-cent. ointment for a wound-dressing.

Baptisin. — The brown resinoid of *Baptisia tinctoria*. Dose: 1 to 5 grains in pill as a laxative, chiefly in dysentery.

Barutin. — A compound of theobromine-barium and sodium salicylate. White powder, soluble in water. Given in cardiac affections. Dose: 4 to 8 drachms of a 1.25-per-cent. solution.

Benzacetin is phenacetin carbonate, and occurs in needle-shaped crystals, very slightly soluble in water. Dose, as a sedative and anti-neuralgic: $7\frac{1}{2}$ to 15 grains.

Benzanilide. — A white powder, insoluble in water, but soluble 1 in 58 of alcohol. Given as an antipyretic to children in 1 to 5 grain doses.

Benzonaphthol (Benzoate of Beta-naphthol). — White, microscopic crystals, without odour, and practically insoluble in water, but soluble in rectified spirit to the extent of 2 or 3 grains in an ounce, and soluble 1 in 3 of chloroform. Proposed as an intestinal anti-

septic, preferable to beta-naphthol. Dose: 10 to 20 grains.

Benzosalin. — The methyl compound of benzoyl-salicylic acid. Dose: 8 grains.

Benzosol (Benzoyl-Guaiacol). A white, crystalline, and odourless powder, insoluble in water. Introduced chiefly as a means of effecting the guaiacol treatment of consumption. It is practically tasteless, and splits up in the system into guaiacol and benzoic acid. Dose: 4 to 10 grains, dispensed as powders mixed with sugar.

Betol (Beta-naphthol-Salicylate). — A remedy for rheumatism and venereal affections. A white, crystalline powder, insoluble in water, but soluble in alcohol and fixed oils. Dose: 5 to 10 grains in powder or pills.

Biebrich Scarlet Red (Medicinal). — Amidoazotoluolazo-beta-naphthol. A dark red-brown powder, insoluble in water, slightly soluble in alcohol, acetone, and benzol, easily soluble in oils and in paraffin when warmed, and 1 in 14 of chloroform. Used in 5 and 10 per cent. oil-solution or as an ointment for wounds.

Biocitin. — The trade-name for a form of lecithin.

Bisciniod. — Bismuth cinchonidine iodide, a red powder.

Bismal is bismuth methylenedigallate, a bluish powder, recommended in 2 to 5 grain doses (in cachets) as an intestinal antiseptic.

Bismon. — Colloidal bismuth oxide. Dose: 5 to 10 grains.

Bismuthan. — A compound of

bismuth, resorcin, and tannin used in diarrhoea as an intestinal antiseptic. Dose for children: 2 to 5 grains.

Bismuth Disalicylate. — A white, odourless powder, insoluble in water and alcohol. Dose: 8 to 12 grains in gastric and intestinal catarrh.

Bismuthol. — A mixture of bismuth phosphate and sodium salicylate, which is used, diluted with French chalk, as a dusting-powder, and as an ointment, 1 to 5, in combination with any approved base.

Bismuthose contains 22 per cent. of bismuth in combination with 66 per cent. of albumen. Dose: 15 to 30 grains or more for children. Also used as a dusting-powder. This should not be confounded with the true *Bismuth Albuminate*, which is a grey powder containing 9 per cent. of bismuth. Dose: 5 to 15 grains, thrice daily, in cholera and diarrhoea.

Bismuth Oxyiodide. — A brownish-red amorphous powder, chiefly employed as a dusting-powder in place of iodoform, but also given internally in 3 to 10 grain doses for gastric ulcer and in enteric fever. Also in gonorrhoea as an injection (1 per cent. with tragacanth to suspend).

Bismuth Compounds not otherwise mentioned are the following: *Benzoate*, dose 5 to 15 grains; *Loretinate* (meta-iodo-ortho-chinolinana-sulphonate of bismuth), dose $7\frac{1}{2}$ grains in the diarrhoea of consumption; *Beta-naphtholate* (orphenol), dose 5 to 15 grains; *Pyrogallate* (helcolsol), a yellow, odourless, taste-

less powder, insoluble in water, used as a dusting-powder in certain skin-diseases, and as an antiseptic internally in 2 to 8 grain doses.

Boral. — The trade-name of aluminium boro-citro-tartrate, a proprietary antiseptic and disinfecting-powder.

Boralite. — A mixture of boric acid and acetanilide.

Borogen (Boric-ethyl Ester). — Used by inhaling in the treatment of certain nasal and lung complaints.

Borosal. — Said to be an aqueous solution of borax, alum, glycerin, and salicylic acid.

Boroveritin. — Hexamethylene-tetramine-triborate. Dose: 15 to 60 grains daily as a bladder antiseptic.

Brandol. — A 1-per-cent. aqueous solution of picric acid, used in the treatment of burns.

Bromal Hydrate—

$\text{CBr}_3 \cdot \text{COH} \cdot \text{H}_2\text{O}$

—a colourless, crystalline compound, soluble in water, similar in action to chloral hydrate. Dose: 3 to 15 grains as a hypnotic.

Bromalbacid. — A substitution-product of albumen occurring as a brownish powder. Dose, $7\frac{1}{2}$ grains. Allied products are *Chloralbacid* (dose 15 to 30 grains as an appetiser) and *Iodalbacid* (dose 15 grains thrice daily in syphilis, bronchial asthma, catarrhal affections, arthritis, and psoriasis).

Bromalin is the short name for hexamethylene - tetramine - bromethylate, a white powder used in epilepsy as a substitute for bromides, in 30 to 60 grain doses.

Soluble in water. Sometimes called *Bromethylformine*.

Bromamide. — A colourless, crystalline powder ($C_6H_5NBr_4$). Dose: 10 to 20 grains in neuralgia.

Bromelin. — The active digestive ferment of the pineapple. Must be distinguished from bromalin.

Bromglidin. — A bromine compound analogous to Iodglidin (*q.v.*).

Bromile. — The hydrobromide of an organic base, in large, white, crystalline scales, 3 parts of which equal 1 part of potassium bromide. Administered hypodermically in 10-per-cent. solution.

Bromipin (Brominol). — The trade-name for a preparation made by reacting on sesame oil with 10 to 33 per cent. of bromine. Dose: 1 to 4 drachms of the 10 per cent. in emulsion as a nervine sedative.

Bromochinal, or dibromo-salicylate of quinine, is an antifebrile remedy. Dose: 8 to 12 grains.

Bromocoll. — A compound obtained by the action of a solution of bromine and tannin on gelatin, and containing 20 per cent. of bromine and 30 per cent. of gelatin. Occurs as a yellowish powder. Given in epilepsy, insomnia, and other nervous diseases in doses of 10 grains, gradually increasing to 2 drachms in epilepsy. Also used externally for eczema, pruritus, and wounds.

Bromoform (Tribromomethane). — A heavy, colourless liquid, analogous in composition to chloroform and iodoform, but more closely resembling the former than the latter in properties. Used for whooping-

cough, but not extensively. Dose: 1 to 2 minims (for children) in emulsion.

Bromol (tribromophenol) is an intestinal antiseptic. Dose: 1 to 2 grains.

Bromophor. — A preparation containing 25 per cent. of organically combined bromine in the form of dibromlaricinolic acid. Used as a pigment in pruritus and erysipelas.

Bromural. — A sedative, *a*-bromo-iso-valerianyl urea— $(CH_3)_2CH.CHBr.CO.NH.CONH_2$ —said to act well in simple insomnia, and as a nerve sedative in neurasthenia, tabes, &c. A white flaky powder, sparingly soluble in water, soluble in alcohol. Dose: 5 to 10 grains.

Brophenin. — Bromo-iso-valeryl amino-acetphenetidin. A white powder given in 8 to 20 grain doses for headache and neuralgia.

Brovalol. — The trade-name of borneol bromo-isovaleric ester, issued in perles as a sedative and nerve tonic.

Cacodylates. — See *Acid, Cacodylic*.

Cadmium Salts. — The *salicylate* is used in 1-per-cent. solution in gonorrhœa, the *sulphate* in syphilis and rheumatism (dose $\frac{1}{24}$ to $\frac{1}{12}$ grain, in pill).

Cæsium Salts. — The following have been used medicinally: *Bitartrate*, dose 4 grains; *iodide*, as a substitute for potassium iodide, in the same doses; *ammonio-bromide*, as a nervine sedative in epilepsy,

dose 15 to 30 grains; and *rubidio-ammonio-bromide*, for the latter purpose, in the same dose.

Caffeine Chloral.—Occurs in white, granular crystals, soluble in water. Dose: 3 to 8 grains hypodermically.

Calcinol is the trade-name of calcium iodate, a white, crystalline powder, recommended as a substitute for iodoform and as a gastrointestinal antiseptic. Dose: 3 to 5 grains.

Calcium Salts.—The following are the doses of the more uncommon salts: *Ammonio-citrate*, 1 to 10 grains; *benzoate*, 10 to 30 grains; *bromide*, 10 to 30 grains; *brom-iodide*, 5 to 10 grains; *hippurate*, 5 to 15 grains; *iodide*, 1 to 5 grains; *lactate*, 10 to 20 grains (this becomes insoluble by keeping, and should be prepared fresh from precipitated chalk and lactic acid); *permanganate*, $\frac{1}{2}$ to $1\frac{1}{2}$ grain; *salicylate*, 8 to 16 grains; *valerianate*, $\frac{1}{2}$ to 3 grains.

Calculusol.—A proprietary preparation, containing piperidine tartrate and potassium bicarbonate in granular effervescing form. A solvent of urates.

Calmin.—A combination of anti-pyryn and heroin.

Calomelol (colloidal calomel).—A greyish-white powder containing 80 per cent. calomel and 20 per cent. albumin. Soluble in water, and used externally for venereal sores.

Camellin.—The glucoside of the seeds of *Camellia japonica*, prescribed in inflammation of the heart. Dose: $\frac{1}{250}$ grain.

Camphosal.—A neutral camphoric ester of santalol, having the formula $C_8H_{14}(CO_2-C_{15}H_{23})_2$, issued as a brownish-yellow oil (containing 15 per cent. of ester) in capsules two of which are a dose. The ester is easily soluble in ether, alcohol, benzol, chloroform, petroleum ether, and ligroin.

Camphossil (camphor salicylate).—A crystalline substance, given as an antipyretic and antiseptic. Dose: 1 to 5 grains in pill.

Cannabin Tannate.—A preparation of *Cannabis indica*, occurring in brownish powder, and given in 5 to 15 grain doses as a calmative.

Cannabinon.—A resin from *Cannabis indica*. Dose as a hypnotic: $\frac{1}{2}$ to 3 grains.

Captol is a fusion of equal parts of chloral hydrate and tannin which is used as a hair-stimulant.

Carbenzym.—Charcoal treated with trypsin. Given in doses of one tablet every three hours after laparotomy operations, to prevent the post-operative collection of gases in the intestines. Also employed as a dusting-powder for indolent wounds.

Carpaine.—The alkaloid contained in the leaves of *Carica Papaya*. $\frac{1}{30}$ to $\frac{1}{15}$ grain of the hydrochloride is given hypodermically as a heart tonic and febrifuge.

Casein Compounds with mercury and iodine have been introduced. The latter is known as *Caseo-iodine*, and resembles thyro-

iodine (one of the active principles of the thyroid gland), and contains 8.7 per cent. of iodine.

Catalysin.—Lecithin bases combined with hæmoglobin-iron. Used in infectious diseases.

Caulophyllin.—The trade-name for tablets containing the active principle of *Caulophyllum thalictroides*. Used in obstetric practice in combination with hyoscine, morphine, and cactine.

Cearin.—An ointment composed of carnauba wax 1 part, ceresin 3 parts, and liquid paraffin 16 parts.

Cellasin.—A ferment which splits up carbohydrates and fats. A brownish-white, amorphous powder soluble in alkaline fluids. Dose : 2 to 15 grains.

Cellotropine is the trade-name of monobenzoyl arbutin, an odourless and tasteless powder, feebly soluble in water (1 in 1,300) and alcohol. Recommended for tuberculosis and scrofula.

Cereprosin.—The trade-name for a preparation obtained by extracting the cerebellum of the sheep with ether. Used in the treatment of certain brain disorders.

Cerolin and **Ceridin** are preparations of yeast.

Cetrarin.—The bitter principle of Iceland moss. A white, crystalline powder, soluble in alcohol and solutions of alkalis. Has stomachic and expectorant properties. Dose : 1 to 3 grains.

Chinaphenine is phenetidin quinine carbonate, a white, tasteless powder, sparingly soluble in water, recommended for whooping-cough.

Dose : As an antipyretic, 2 to 5 grains ; for neuralgia and malaria, 15 to 30 grains.

Chinaphthol is quinine betanaphthol-monosulphonate, recommended for typhus, typhoid fever, dysentery, lupus, and acute rheumatism. Dose : $7\frac{1}{2}$ grains.

Chinoline Sulpho-salicylate.—A white, crystalline salt, slightly soluble in cold water, readily soluble in hot water and hot alcohol. An antirheumatic and antipyretic in doses of 5 to 15 grains.

Chinosol.—A yellow powder (neutral orthochinoline sulphate), soluble in water, much used as an antiseptic and disinfectant, and also internally in 5-grain doses for enteric fever. Should be given in cachets or tablets.

Chinotropin is a combination of urotropin and quinic acid. Used as a uric-acid solvent. Dose : 10 grains and upwards.

Chloralamid.—The trade-name of chloral formamide, B.P.

Chloralimide is the trade-name for trichlor-ethylidenimide, a crystalline substance, insoluble in water but soluble in alcohol, ether, and oils. Dose : 30 to 45 grains as a hypnotic.

Chloralose.—Obtained by the interaction of anhydrous chloral and glucose. White, crystalline powder, almost insoluble in water, and given in doses of 3 to 12 grains (in cachet) as a hypnotic.

Chlorethoform.—Chloroform prepared from acetone, to which 0.25 per cent. of ethyl chloride has been added.

Chloretone. — The trade-name of trichlor-butyl alcohol—



—or acetone-chloroform (must not be confounded with chloroform, CHCl_3 , made from acetone). It is a white, crystalline solid, resembling camphor in appearance, and, like it, rotates in water. Soluble in alcohol, chloroform, and glacial acetic acid; sparingly soluble in water (3 grains in 1 ounce). Recommended as a hypnotic, gastric sedative, and specific against sea-sickness in 5 to 20 grain doses (in capsule or cachet); also as a local anæsthetic. It volatilises readily, and should not be dispensed as powders in paper.

Chloryl. — A proprietary name for ethyl chloride.

Choleglycerin. — The trade-name for a glycerin of the pancreas and pepsin ferments, used in affections of the gall-bladder.

Chrysyl. — The trade-name for zinc-boro-picrate, a yellow powder employed in skin and eye affections.

Cicatricine. — The trade-name for 'sterules' of a solution of thio-sinamin 20, antipyrin 33, and water to 100.

Cimicifugin. — The resinoid of the root of *Cimicifuga racemosa*, an antispasmodic and nervine stimulant in doses of $\frac{1}{2}$ to 2 grains.

Cinerol. — The trade-name for a mercurial cream consisting of mercury 4 grams, sterilised palm oil 20 c.c., and sterilised sesame oil 20 c.c. Used as an intramuscular injection in syphilis like Lambkin's cream and grey oil.

Citarin. — A white, crystalline

powder (sodium anhydromethylene citrate), which is used as a uric-acid solvent in gout and rheumatism in doses of 15 to 30 grains three or four times a day.

Citrophen. — A white powder (paraphenetidin citrate) used in 8-grain doses (as powders) for neuralgia and as an antipyretic.

Citrullin. — The resinoid of colocynth, possessing the properties of the drug, and administered *per rectum* in doses of $\frac{1}{12}$ to $\frac{1}{8}$ grain, dissolved in 15 minims each of alcohol and glycerin, with a sufficiency of water.

Cobalt and Potassium Nitrite, or cobalt yellow, is used in asthma and heart troubles. Dose: $\frac{1}{4}$ to $\frac{1}{2}$ grain.

Colalin. — A yellow powder. Is said to be a combination of cholalic acid and magnesium carbonate. An intestinal antiseptic and hepatic stimulant. Dose: $\frac{1}{8}$ to $\frac{1}{4}$ grain.

Collargolol, or colloid silver (*argentum cretè*), occurs in black, glistening scales, and is said to contain 90 per cent. of metallic silver. Dose: $\frac{1}{2}$ to 2 grains in pill or tablet. Applications (antiseptic) are 1 to 5 per cent. or stronger.

Comain. — A preparation obtained by the action of camphor and iodoform on sesame oil, mono- and di-iodide of camphor being formed. Used in tuberculosis.

Conine and its Salts. — The hydrobromide is most used, although rarely, in asthma and kindred nervous affections of the bronchi. Dose: $\frac{1}{100}$ to $\frac{1}{80}$ grain.

Convallamarin, the peculiar glu-

coside of *Convallaria majalis*, is prescribed in heart-disease, especially when accompanied by œdema, as a heart-stimulant and diuretic. Dose: $\frac{1}{2}$ to 1 grain.

Cordol.—Tribrom-salol. A crystalline powder insoluble in water, sparingly soluble in alcohol and in ether.

Cornutine.—An alkaloid isolated by Kobert from ergot, and said to possess the uterine stimulant action of the drug. Dose (of the citrate): $\frac{1}{12}$ to $\frac{1}{8}$ grain.

Coryfin.—The ethyl-glycollic ester of menthol. A colourless, odourless, oily liquid. Used in pharyngeal catarrh as a gargle (5 drops to 10 oz. of tepid water) or inhalation (10 drops to 1 pint of hot water), and as a paint in nasal catarrh and headache. Dose as a carminative: Four drops on sugar.

Cosaprin is a sodium acet-parasulphanilate, and is a substitute for acetanilide, readily soluble in water. Dose: 3 to 8 grains.

Cotargent.—The trade-name for a preparation of colloidal silver.

Cotarnine Hydrochloride.—A derivative of narcotine, occurring in yellowish crystals, and called *Stypticin* (Merck), owing to its powerful styptic properties. It is given in $\frac{1}{2}$ to 1 grain doses for uterine hæmorrhage and as a uterine sedative; also administered subcutaneously (1 to 3 grains) in urgent cases. Cotarnine phthalate, or *Styptol*, is similarly used; also for spermatorrhœa. It is supplied in tablets of $\frac{3}{4}$ grain (Knoll).

Cotoin, the active principle of

coto-bark, is a remedy for dysentery and similar intestinal disorders which are not sanguineous. Dose: 1 to 3 grains.

Creolin and Cyllin.—Proprietary antiseptic solutions, used in surgery, and administered internally in doses of 2 to 5 minims, in capsules.

Creosoform.—A solid condensation-product of creosote and formic aldehyde, used as a disinfectant.

Creosotal (Carbonate of Creosote) is an amber-coloured, viscid fluid containing 92 per cent. of creosote, and used in the treatment of tuberculosis. Insoluble in water, glycerin, and alcohol, but soluble in oils, and best given along with cod-liver oil, or in capsules. Dose: 20 minims, gradually increased to four times as much, three times a day. For catarrh the dose is 5 to 15 minims.

Crurin is the name given to quinoline bismuth sulphocyanide, a yellowish-red powder used in place of iodoform.

Cuprol.—A combination of nuclein with copper, of which it contains 6 per cent. Readily soluble in water, and used in 5-per-cent. solution for granular ophthalmia.

Cusol.—The trade-name for copper citrate made soluble by addition of sodium chloride and boro-citrate. Powder, ointment, and solutions are used in ophthalmic practice.

Cycloform.—Para-amido-benzoic isobutyl ester. A yellowish, crystalline powder slightly soluble

in water, readily soluble in alcohol and in ether. Used as a local anæsthetic in the form of a 5 or 10 per cent. ointment, or as a dusting-powder.

Deba.—A trade-marked name for barbitone, B.P.

Decilan.—A potassium-oleate (soft soap) solution containing formaldehyde as trioxymethylene. A yellow, alkaline, antiseptic and disinfectant liquid which mixes clear with water, alcohol, and glycerin.

Dedosal.—A physiologically standardised tablet of digitalis active principles, each representing $1\frac{1}{2}$ grain of the leaf.

Dermatol (Subgallate of Bismuth).—A heavy, pale-yellow, and odourless powder, employed as an iodoform-substitute. May be used alone as a dusting-powder, but preferably diluted (*e.g.*, dermatol $\mathfrak{z}\mathfrak{j}$., starch $\mathfrak{z}\mathfrak{j}$., talc $\mathfrak{z}\mathfrak{v}\mathfrak{i}\mathfrak{j}$.). The ointment may be made with lanoline or vaseline ($\mathfrak{z}\mathfrak{j}$. or $\mathfrak{z}\mathfrak{i}\mathfrak{j}$. to $\mathfrak{z}\mathfrak{j}$.).

Dermogen is the trade-name of zinc peroxide (55 per cent.). Used as a dusting-powder for wounds.

Desalgin.—Colloidal chloroform, employed in hepatic and abdominal colic in doses of 4 to 15 grains.

Dextroform.—A combination of formaldehyde and glycerin, occurring as a white powder, soluble in water. Used in venereal complaints.

Diabetin is levulose, and is given to diabetics in place of sugar.

Dial-ciba.—Di-allyl barbituric acid. A hypnotic issued in 0.1-gramme tablets.

Dianol.—The trade-name of three glycerin lactic esters employed in nose and throat practice: Dianol I. = 54.8 per cent. lactic acid, Dianol II. = 76.3 per cent., and Dianol III. = 87.7 per cent.

Diaphanite.—A mixture of cocoa, sugar of milk, salep, and finely powdered lodestone, used in x-ray work instead of bismuth subnitrate. For an examination of the stomach 4 to 6 oz. is mixed with 8 oz. of water and swallowed.

Diaphtherin, or oxychinaseptol. Occurs as a crystalline powder, and is used in $\frac{1}{2}$ to 2 per cent. water solutions as an antiseptic. Dose in rheumatic fever: $\frac{1}{8}$ to $\frac{1}{4}$ grain for children, and $7\frac{1}{2}$ to 15 grains for adults.

Diaspirin.—The trade-name for succinyl-salicylic acid. A white crystalline powder, with difficulty soluble in water, and having, like aspirin, a marked diaphoretic action in 15-grain doses.

Diazellose.—A hemicellulose obtained from agar-agar. A light yellow powder, readily soluble in water and tasting like malt. Dose: $\mathfrak{z}\mathfrak{v}\mathfrak{j}$. to $\mathfrak{z}\mathfrak{i}\mathfrak{s}\mathfrak{s}$. daily as a laxative.

Diazyme.—The trade-name for the amylolytic enzyme of the pancreas. Issued as essence and glycerol.

Digalen.—Cloetta's solution of digitalis principles. Dose: 1 c.c. (= tr. digitalis mxx.).

Digipuratum.—The trade-marked name of a preparation containing the water-soluble active principles of digitalis. Issued in powder and tablet forms (including

milk sugar as diluent), $1\frac{1}{2}$ grain being the dose.

Digitrophan.—Trade-name for the active principles of digitalis-leaves and of strophanthus-seeds, in tablet equal to $1\frac{1}{2}$ grain of digitalis and $\frac{3}{4}$ grain of strophanthus.

Digitalin.—Various kinds are on the market, also *digitoxin*, supposed to be the active principle. The crystalline glucoside is given in doses of $\frac{1}{250}$ to $\frac{1}{84}$ grain.

Diiodoform (Ethylene Periodide), C_2I_4 , contains 95.28 per cent. of iodine, and is used in gynecological and venereal practice in France. A 5-per-cent. ointment with vaseline (and 1 per cent. cocaine hydrochloride) is preferred.

Dimethylidimethylene Ether.—Obtained by treating menthol with symmetrical di-halogen methyl ether. Occurs in scaly crystals, and is used as an antipyretic and antiseptic. When combined with one molecule of formaldehyde, *dimentholformal* is obtained.

Dioform.—Acetylene dichloride. Used as an anæsthetic.

Dionine (Ethylmorphine Hydrochloride).—Codeine is methylmorphine. Recommended in the treatment of bronchial affections, especially bronchitis, in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain, either in mixture or pill. It is a white, crystalline powder, and is best given in any pectoral mixture. Is also used as a local anæsthetic for the eye (1 to 5 per cent. solution).

Diosmal.—A petroleum ether and alcohol extract of buchu. Dose: 2 to 5 grains.

Dioxygen.—A 3-per-cent. solution of hydrogen peroxide.

Diplosal.—The trade-name for salol in which the phenol group is replaced by salicylic acid. It occurs in white, odourless needles insoluble in water and dilute acids, soluble in ether and alcohol. It has a slightly bitter taste. Dose: 15 grains in rheumatism, neuralgia, pleurisy, cystitis, and allied ailments.

Dipropaesin.—A white, odourless, and tasteless powder insoluble in water but soluble in alcohol. Dose (for intestinal and gastric pains): $7\frac{1}{2}$ grains (15 grains produces sleep).

Ditaine Hydrochloride.—The salt of an alkaloid obtained from dita-bark. Dose: $\frac{1}{12}$ to $\frac{1}{8}$ grain.

Dithion is the synonym for sodium dithio-salicylate, an antipyretic of considerable power. Dose: 3 grains.

Diuretin (Sodio-theobromine Salicylate).—A white and odourless powder, with an alkaline, bitter taste. Deliquescent. A powerful diuretic, less hurtful to the heart than alkaline salicylates. Dose: 15 grains dissolved in a tablespoonful of chloroform-water.

Dormiol.—A 50-per-cent. solution of amylene-chloral, insoluble in cold water, is decomposed by hot water, and is soluble in alcohol. Dose: 10 to 50 minims, emulsified with an equal volume of acacia mucilage and made up with water and syrup.

Droserin.—Proprietary tablets of the active principle of certain

droseras. Used in the treatment of whooping-cough. Issued in two strengths.

Duboisine Sulphate.—The salt of an alkaloid obtained from the leaves of *Duboisia myoporoides*. Soluble in water. It resembles hyoscine in action. Dose: $\frac{1}{120}$ to $\frac{1}{30}$ grain.

Duotal.—A trade-name for guaiacol carbonate, B.P.

Dymal (Didymium Salicylate). A fine, odourless powder, used as such, or in a 10-per-cent. ointment with lanoline, for eczema and other skin-affections.

Ehrlich-Hata ('606'). — See *Salvarsan*.

Eigon Preparations are made by the action of iodine and bromine upon albumen, the resulting products being made into galenical preparations (proprietary).

Ektogan is another trade-name for zinc peroxide (dermogen).

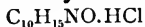
Endotin.—Said to be pure tuberculin.

Entericin.—A preparation of *Monsonia biflora*. Used as a prophylactic to hæmorrhage in enteric fever. Dose: $\frac{1}{2}$ to 4 drachms.

Enterinum.—The jejunum and duodenum of the sheep in the form of a yellow powder. Given in the treatment of gastric disorders.

Eosote.—A liquid and inodorous valerianate of creosote, given in doses of 10 to 30 grains (in capsules) for tuberculous affections.

Ephedrine Hydrochloride—



—prepared from the leaves of *Ephedra vulgaris* var. *helvetica*.

A 10-per-cent. solution in water is used as a mydriatic. Dose: 1 to 2 drops.

Epicarín is beta-oxynaphthyl-ortho-oxymetatoluic acid, a condensation-product of beta-naphthol and cresolic acid. Used externally in 5 to 10 per cent. ointment, or solution in oil or spirit, for psoriasis, eczema, and scabies.

Epinephrin.—A trade-name for the active principle of the suprarenal gland, but differing from suprenin. Adrenalin, B.P.

Ergoapiol.—Trade-name for capsules of apiol and ergot.

Ergotoxine.—The alkaloidal active principle of ergot. Dose (of the phosphate): $\frac{1}{150}$ to $\frac{1}{50}$ grain.

Ergoval.—A physiologically standardised extract (1 in 1) of selected Spanish ergot of rye. Dose: 10 to 30 minims, or 1 dr. in urgent cases.

Ernutine.—A trade-name for a solution of ergotoxine phosphate and parahydroxyphenylethylamine (principles to which ergot owes its ebolic properties). Supplied in hypodermic tabloids of $\frac{1}{100}$ grain and in ampoules; also for oral use and in combination with strychnine sulphate or with morphine sulphate.

Erythrol Tetranitrate.—A crystalline substance of the nitroglycerin class used in angina pectoris in $\frac{1}{2}$ to 1 grain doses made into tablets with cocoa-butter and chocolate. Must be handled with caution (see page 379). Under the name of *Erythrol* a double iodide of bismuth and cinchonidine is in use in France for treatment of dyspepsia. It is given

in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain with 1 to 2 grains of magnesia. Dispensers should be careful in regard to these two totally distinct compounds.

Estone.—Trade-name for a basic aluminium acetate, which is mixed with starch for use as an astringent dusting-powder.

Estoral.—Menthol boric ester $B(O.C_{10}H_{19})_3$, a white, crystalline powder which is made into snuff for nasal catarrh.

Ethoxycaffeine.—This compound ($C_8H_9.OC_2H_5.N_4O_2$) is obtained by boiling monobromocaffeine with alcoholic potash. A crystalline substance, used for sick-headache and neuralgia. Dose : 5 to 15 grains.

Ethyl Bromide (Hydrobromic Ether).—A colourless, volatile fluid possessing an odour like chloroform. Its specific gravity should be 1.420 if pure. It is used as an anæsthetic, like chloroform. Dose : 15 minims. A distinct compound, *Ethylene Bromide* ($C_2H_4Br_2$), which is a heavy, colourless liquid (s.g. 2.189), becoming crystalline at 9° C., has been recommended for the cure of epilepsy in doses of 1 to 2 minims.

Ethyl Chloride (Hydrochloric Ether) is a gas at the ordinary temperature, but is supplied liquefied in tubes for producing (a) local and (b) general anæsthesia.

Ethyl Iodide (Hydriodic Ether). An almost colourless, ethereal liquid (s.g. 1.94), used by inhalation, in 5 to 10 minim doses, for the relief of asthma, chronic bronchitis, and dyspnoea. Dispensed in glass capsules.

Ethyl-morphine Iodide.—Dionine iodide. Employed instead of dionine in certain affections of the eye. Applied as a powder.

Eubornyl.—Alpha-bromo-isovalerianic borneol ester. A syrupy liquid, soluble in alcohol, and used in nervous troubles.

Eucaine Hydrochloride.—There are *alpha* and *beta* varieties of this, the former being the salt of benzoyl-*n*-methyl tetramethyl- γ -oxypiperidine-carbonic methyl ester, and the latter the salt of benzoyl-vinyl diacetone alkylamine, the lactate of which is benzamine lactate, B.P. Eucaine is a local anæsthetic of the same power as, but of only one-fifth the toxicity of, cocaine. The *alpha* variety is for general use, and is soluble 1 in 10 of water, 15 to 60 minims of a 6-per-cent. solution being employed. The *beta* variety is for ophthalmic purposes, is soluble 1 in 28 of water, and is used in 2-per-cent. solution. Dose : $\frac{1}{10}$ to $\frac{1}{2}$ grain.

Eucapren.—A solution of suprenin (1 : 5,000) with 1 per cent. of beta-eucaine lactate. A local anæsthetic.

Eudermol.—A crystalline, colourless, water-soluble salicylate of nicotine, recommended as a 1-in-1,000 ointment for parasitic affections of the skin, and as a nursery parasiticide.

Eudoxine.—The bismuth salt of Nosophen (*q.v.*). A brown powder, containing 53 per cent. of iodine, used as an intestinal antiseptic in doses of 4 to 10 grains.

Eudrenine.—A combination of

eucaïne and adrenalin for local anæsthesia.

Euferrol.—A combination of arsenic and iron for producing Leuco water.

Eugallol is a red-brown syrupy mixture of pyrogallol monoacetate 67 and acetone 33 soluble in alcohol and water. Used like pyrogallol acid for chronic psoriasis, eczema, and lupus.

Eugenoform is a sodio-eugenol carbonol, a crystalline compound readily soluble in water. It is an intestinal antiseptic in cholera, typhus, and other infectious diseases. Dose : $7\frac{1}{2}$ to 15 grains, morning and evening.

Eugenol is the active principle of oil of cloves, and is an oily liquid, with the characters of that oil. It is given internally in 5 to 30 minim doses for tuberculosis; also used externally for eczema and other skin-diseases in combination with wool-fat.

Eulatin.—Trade-name for antipyrin parabromobenzoate, a white, odourless powder for whooping-cough. Issued in 4-grain tablets.

Eulaxans.—A combination of one molecule of phenolphthalein and two of sodium hydroxide. Dose : $\frac{3}{4}$ to 3 grains, preferably in sugar-coated tablets or in pill.

Eumictin.—Proprietary capsules of santalol, salol, and urotropine, for gonorrhœa.

Eumydrine.—The trade-name for methyl-atropine nitrate. A powerful mydriatic which acts more strongly than atropine in 1 to 2 per cent. solution. Dose (as an anti-hidrotic) : $\frac{1}{60}$ to $\frac{1}{24}$ grain.

Eunatrol is the trade-name for sodium oleate, recommended for gall-stones in doses of 4 grains in pill three or four times a day.

Eupecin.—A compound of pine tar and formaldehyde, in grey powder. Used in skin-diseases.

Euphorine (Phenyl Urethane). A white, crystalline powder, insoluble in water. Used chiefly for rheumatic affections. Dose : 3 to 10 grains.

Euphthalmine, as it occurs in the market, is the hydrochloride of a synthetic base ($C_{17}H_{23}NO_3 \cdot HCl$), which is the mandelic-acid derivative of eucaïne. It is a crystalline powder possessing mydriatic properties, used in 5-per-cent. aqueous solution, 2 to 3 drops giving a dilation of the pupil which persists for three to six hours.

Euphyllin.—The trade-name for a combination of equal proportions of primary and secondary theophyllin (theocin) and ethylendiamine. A white, crystalline powder readily soluble in water, and given intramuscularly (6 grains in water 25 minims), or in suppository (5 grains) or enema (8 grains), as a diuretic in uræmia.

Eupyrin is vanillin ethylcarbonate-paraphenetidine, a safe antipyretic for children and the aged. Soluble in alcohol, and slightly in water. Dose : 15 to 25 grains.

Euquinine.—The ethyl carbonate of quinine, a white powder which is almost tasteless yet exerts all the physiological action of quinine. The dose is the same as of quinine sulphate, and the salt is specially

useful for children. Should be given in powders. It is tasteless because it is so feebly soluble.

Euresol is monoacetate of resorcin, a substance resembling honey, which is used as 1-in-20 or 1-in-10 ointment (or acetone solution) in place of resorcin.

Eurobin is chrysarobin triacetate, resembling chrysarobin in appearance and properties, and, like it, used in skin-diseases—preferably as acetone solution (1 to 20 per cent.).

Europhen.—Isobutyl-ortho-cresol iodide, a substitute for iodoform, occurring as a yellow, amorphous powder containing 28 per cent. of iodine. Applied in combination with boric acid as a powder, or as an ointment with lanoline, or in olive-oil solution (1 in 20).

Euscolol.—The trade-name for chemically pure scopolamine hydrobromide. Used for the production of scopolamine-morphine anaesthesia. Dose: $\frac{1}{200}$ to $\frac{1}{100}$ grain.

Eustenin.—Trade-name for sodio-theobromine-sodium iodide. Given in arteriosclerosis, angina pectoris, and aortic aneurism. Dose: 8 to 15 grains.

Exalgin (Methylacetanilide). In white crystals, not unlike strychnine. Sparingly soluble in water. A powerful analgesic, specially serviceable in certain forms of headache and neuralgia. Dose: $\frac{1}{2}$ to 4 grains (not more). Dissolve the dose in 10 minims of rectified spirit, add 20 minims of syrup, and make up to 1 drachm with chloroform-water.

Exodin is diacetyl-rufgallic tetramethyl ether. A yellowish powder, with purgative properties like emo-

din and phenolphthalein. Dose: 5 to 20 grains.

Fenchyval.—Proprietary name for fenchyl-isovalerianic ester, an almost colourless liquid recommended as a sedative in hysteria.

Feolathan.—Trade-name for ferro-ammonium lactate. Issued in the form of pills each containing $1\frac{1}{2}$ grain.

Ferralbol.—A combination of egg-albumen and iron (3 per cent.) with 1 per cent. of lecithin. Issued in $7\frac{1}{2}$ -grain chocolate tablets.

Ferratin.—The trade-name of iron albuminate, a red-brown, odourless and tasteless powder containing 7 per cent. of iron, soluble in alkali-solutions. Dose: 8 grains.

Ferratogen.—A hæmatinic preparation made by growing yeast in iron solution. Greyish-yellow powder. Dose: 5 grains.

Ferratose.—A liquid preparation of ferratin.

Ferricodile.—Proprietary ampoules and pills of cacodylate of iron.

Ferrinol.—A tasteless and non-astringent brown powder, containing 6 per cent. of iron and $4\frac{1}{2}$ per cent. of phosphorus as a combination with nuclein. Readily soluble in water. Dose: 3 to 6 grains.

Ferrogilidine.—A red-brown, odourless and tasteless powder put up in tablets. A powerful hæmatinic. Dose: One to two.

Ferropyrin.—An orange-red powder representing in combination about 2 parts of antipyrin and 1 part of ferric chloride. Readily soluble in water (1 in 5). Used in doses of 5 to 15 grains for anæmia, especially when accompanied by

neuralgia, and externally in 1-per-cent. solution as a gonorrhœa-injection and in saturated solution or powder as a styptic.

Fersan.—Prepared from fresh blood, and containing iron and phosphorus in combination with albuminoid bodies. Dose in anæmia : 30 grains and upwards.

Fetron.—An ointment-basis introduced by Liebreich, and consisting of vaseline with 3 per cent. of 'stearinic-anilide.' Takes up more water than vaseline and less than lanoline.

Fibrolysin.—A soluble compound of Thiosinamine (*q.v.*) with sodium salicylate. Supplied in glass ampoules containing 2 to 3 c.c. for injection.

Filicone.—A principle obtained from *Dryopteris spinulosa* (*Aspidium spinulosum*). Used as an anthelmintic in doses of 30 grains combined with castor oil to $\frac{3}{4}$ ss.

Filmarone.—A brown powder prepared from male-fern. Used as an anthelmintic in doses of 8 to 12 grains.

Filmogen.—A trade-name for acetone-collodion.

Floricin.—The residue left on distilling off the volatile portion of castor oil. Used as an ointment-base.

Fluorescein.—Resorcin-phthalain, a yellow dye, is, in weak solution, used in ophthalmic work for diagnosing ulcers, denudations, and the like, which it dyes green, while healthy surfaces are stained yellow only. The solution is made of 10 grains of the dye and 13 grains of sodium bicarbonate in 1 ounce of water.

Fomitin.—A liquid extract prepared from species of *Fomes*, a fungus which grows on certain trees of the genus *Prunus*. Used in bladder and menstrual affections. Dose : $\frac{1}{2}$ to 1 fluid ounce.

Forgenin (tetramethyl-ammonium formate).—A crystalline substance, with an action resembling digitalis.

Formaldehyde.—In 40-per-cent. solution was introduced under the name of 'Formalin' as an antiseptic. *Liv. formaldehydi*, B.P., is 36 to 38 per cent. A 1-in-1,000 solution is used as an eye-lotion, and for surgical purposes 1-in-400 to 1-in-200 solutions are employed.

Formamint.—The trade-name of tablets composed of formaldehyde, menthol, and milk sugar. Used chiefly as an oral antiseptic.

Forman (Formawn).—A combination of formaldehyde and menthol, which, on heating, gives up both of these bodies. Used with hot water as an inhalation in catarrhs and also as formawn-wool for the nostrils and ears.

Formaquol.—A trade-name for sodium formate.

Formates.—See *Acid, Formic*.

Formestone.—Trade-name for formaldehyde aluminium acetate. Used as dusting-powder.

Formicin (formaldehyde acetamide).—A thick liquid, miscible with water or alcohol and used as an antiseptic. Dose : 10 to 15 grains.

Formidin.—Methylene disalicylic iodide. A white powder turning reddish-yellow on exposure

to light, insoluble in water, acids, and alcohol, but dissolving readily in alkaline solutions with decomposition, hence its use as an intestinal antiseptic, in doses of 1 to 5 grains. Also used as an iodoform substitute.

Formin is hexamethylene-tetramine, $(\text{CH}_2)_6\text{N}_4$ —*i.e.*, hexamine, B.P. The salicylate of the substance is known as *Saliformin*, and the combination with iodoform is a red, crystalline powder called *Iodoformin*, which contains 75 per cent. of iodoform.

Formobas.—A proprietary formaldehyde preparation the solutions of which are slightly alkaline.

Formoform.—A mixture of formaldehyde, thymol, zinc oxide, and starch, used chiefly as a foot-powder.

Formopyrin (methylene-diantipyrin).—A crystalline compound combining the action of its components (antipyrin and formaldehyde), insoluble in water. Dose: 5 to 15 grains.

Formurol.—A combination of hexamethylene-tetramine with sodium citrate. A white powder, used as a urinary antiseptic. Dose: 15 grains.

Formylphenetid.—Paræthoxyformanilide, in crystalline needles, soluble in hot water. Dose: 3 to 6 grains for cramp.

Fortoin.—The trade-name of a compound of cotoine and formaldehyde. Occurs as a yellow powder, insoluble in water, soluble in alcohol and alkalis. Given in 3-grain doses for diarrhoea, and used in $\frac{1}{2}$ to 1 per

cent. solutions (5-per-cent. alcohol) as an antiseptic.

Fulmargin.—A special solution of colloidal silver (for injections) in 5-c.c. ampoules.

Gallacetophenone.—The methyl-ketone derivative of pyrogallol. A yellowish powder, used as an ointment (10-per-cent.) or solution (1 part of the powder and 8 parts of sodium acetate in 25 parts of water) as a cutaneous parasiticide and in psoriasis.

Gallanol.—A compound of aniline and gallic acid, occurring as a grey powder, and used in psoriasis and eczema as a dusting-powder (pure or 1 to 3 of salt), as an ointment with vaseline (℥j.-℥j. to ℥j.), or in alcoholic solution (20 per cent. with 1 per cent. of solution of ammonia).

Gallicin.—Methyl gallate in greyish-white crystals. Resembles pyrogallol in properties, and is used in the treatment of conjunctivitis by applying to the eye as a powder, preceded by cocaine to produce anæsthesia of the part.

Gallobromol is dibromogallic acid, a light-brown, crystalline powder, soluble 1 in 10 of water. Introduced for the treatment of epilepsy (dose 10 to 30 grains), but is also used as an antiseptic in gonorrhœa, gleet, cystitis, and eczema.

Gallogen.—The trade-name of ellagic acid ($\text{C}_{14}\text{H}_{10}\text{O}_{10}$). Is the astringent principle of divi-divi, and occurs as a pale yellow, light, tasteless powder, insoluble in water, but soluble in alcohol and in alkali-solutions. Recommended as an

astringent in diarrhoea. Dose: For children 4 to 8 grains, for adults 15 grains, in mixture with acacia mucilage and flavouring syrup.

Gastrosan.—Trade-name for bismuth disalicylate.

Gelasepsin.—Proprietary name for a sterilised solution of gelatin (1 to 2 per cent.) in normal saline solution. Used as injection.

Geoform.—A 'condensation-product' of guaiacol and formaldehyde, used as a substitute for guaiacol and in the same doses.

Geosot is guaiacol valerianate, and resembles in chemical and physical properties creosote esters. Used in tuberculosis and as an intestinal disinfectant. Dose: 2 to 5 minims, preferably in capsules.

Geotalose.—Mucocolloidal creosotal. A greyish-green substance soluble in water and used in diarrhoea and vomiting.

Glandulen.—A preparation of the bronchial gland of the sheep, put up in tablets (with milk sugar), each representing about a grain of the fresh gland. For tuberculosis.

Glutannol.—A combination of vegetable fibrin with tannin. Being insoluble in the gastric juice, is recommended as an intestinal astringent. Dose: 5 to 15 grains, in powder, or in mixture with acacia mucilage.

Glutol.—Gelatin saturated with formaldehyde and reduced to powder. An antiseptic application for wounds and indolent ulcers.

Glycerophosphates.—By the action of anhydrous phosphoric acid upon glycerin, the three hydroxyl

groups in the glycerin are replaced by phosphoric anhydride, a compound resulting which combines as an acid with various bases. A few years ago Dr. A. Robin, of Paris, found that the glycerophosphates have tonic properties in the treatment of neurasthenia and other nervous diseases, as well as in chlorosis, sciatica, tic douloureux, phosphaturia, and locomotor ataxia. At first hypodermic injections of the calcium or sodium glycerophosphate were used, but various preparations are now given *per os*. The calcium, lithium, potassium, and sodium salts are given in doses of 5 to 15 grains, the iron salt 3 to 5 grains, and quinine glycerophosphate in the usual doses of quinine salts: there are a basic and a neutral glycerophosphate, and either may be given in pill. The other glycerophosphates are usually given in cachet, elixir, glycerin, syrup, and wine, the syrup being most popular. The salts of the inorganic bases named are soluble in water.

Glycobenphene.—An antiseptic used for wounds, eczema, &c., containing boric and benzoic acids, phenol, glycerin, and zinc oxide.

Glycogenal.—A yellow powder prepared from glycogen. Soluble in water. Tonic and bactericidal in action. Dose: 5 to 15 grains.

Glycosal.—The trade-name of glycerin salicylate. A white, crystalline powder, recommended as a urinary antiseptic, and in cystitis and rheumatism. One part dissolves in 100 parts of cold water. Dose: 10 to 20 grains.

Gold, Salts of.—The chloride and sodium-chloride, bromide and potassio-bromide are used medicinally. All are best given in pills. Dose: $\frac{1}{60}$ to $\frac{1}{15}$ grain.

Gonoral.—A trade-name for Santalol (*q.v.*).

Gonosan.—The name of a proprietary preparation made from kava-kava and sandalwood oil, which is said to combine 80 per cent. of the latter with 20 per cent. of the *alpha* and *beta* kava resins. A yellowish-green oil, soluble in spirit. Dose: 5 grains, in capsule.

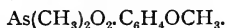
Graminol.—See *Pollantin*.

Guacamphol.—Guaiacol-camphorate. A white, tasteless and odourless powder used for night sweats in doses of 3 to 15 grains.

Guaiacetin is the trade-name of sodium pyrocatechin-acetate. A white, tasteless powder, soluble in water, recommended for tuberculosis. Dose: $7\frac{1}{2}$ grains.

Guaiacol Benzoate.—See *Benzosol*. This and other guaiacol salts are anti-tuberculous.

Guaiacol Cacodylate, or *Cacodyliacal*, forms a white, crystalline powder, is very hygroscopic, soluble in water, alcohol, or glycerin, with a slight caustic taste and alliaceous odour. It has the formula



The solution in oil has been used by subcutaneous injection for tuberculosis. Dose: $\frac{1}{2}$ to 2 grains.

Guaiacol Camphorate (Guacamphol).—A white, crystalline compound of guaiacol and camphoric acid, possessing the therapeutic properties of both. Dose: 5 grains,

gradually increased to 30 grains, thrice daily.

Guaiacol Cinnamate.—See *Styracol*.

Guaiacol Ethylene.—A crystalline, inodorous, tasteless guaiacol compound, said to be well tolerated by the stomach. Dose: $7\frac{1}{2}$ grains in cachet thrice daily, gradually increased to 15 grains.

Guaiacol Iodoform is a reddish-brown, syrupy solution of iodoform 1 part, guaiacol 4 parts, and almond oil 1 part. A 1-in-16 solution of this in olive oil has been used subcutaneously (dose 45 minims), in phthisis and pleurisy.

Guaiacol Phosphate.—A white powder, insoluble in water, soluble in alcohol. Dose: 6 to 12 grains.

Guaiacol Piperidine (Guaiaperyl).—A white, crystalline powder, more soluble in water (1 in 30) than other guaiacol compounds. Dose: 5 to 30 grains.

Guaiacol Salicylate, or guaiacol salol.—White, crystalline powder, combining the properties of its constituents. Dose: 15 grains in cachet.

Guaiacyl.—The name given to calcium orthoguaiacol-sulphonate. A 1-in-20 solution in water is used subcutaneously as a local anæsthetic. Dose: 10 to 20 minims. Under the name *Ethacol* (not 'Æthacol,' *q.v.*) a combination of guaiacol sulphonate and ethyl-morphine (dionine) is marketed. It is a crystalline solid, soluble in water, and is an ingredient of *Triacol*.

Guaiadol.—Para-iodo-guaiacol.

A colourless and amorphous substance, soluble in alcohol but insoluble in water. Dose: $\frac{3}{4}$ grain subcutaneously, in equal parts of glycerin and water, for tuberculous affections.

Guaiamar, or guaiacol glycerate, is a white, crystalline powder soluble in water (1 in 20) and alcohol. Dose: 5 to 15 grains, in cachet.

Guaiaguin is quinine-guaiacol bisulphonate, a yellowish powder which dissolves in water. Dose: 5 to 10 grains, in cachet, as an antiperiodic and intestinal antiseptic.

Guaiaguinol (Guaiachinol) is quinine dibromoguaiacolate, and occurs in yellow crystals. Soluble in water (4 in 5). Dose: 5 grains or more.

Guaiasanol is the hydrochloride of diethylglycocol-guaiacol. In white crystals, soluble in water, and given in large doses (30 to 60 grains), compressed.

Guethol.—An oily liquid prepared from guaiacol by putting C_2H_5 into the molecule in place of CH_3 . For description see *Æthacol*.

Gynoval.—Perles of isoborneol isovalerate (4 grains), a colourless fluid insoluble in water, but easily soluble in alcohol, ether, acetone, benzol, and chloroform. Dose: 4 grains; in nervous insomnia, 8 grains before bedtime.

Hæmaformyl.—A combination of hæmatoxylin and formaldehyde (veterinary). Given internally for gastric affections, and applied externally in the treatment of wounds.

Hæmalbumin.—The trade-name of a brownish powder representing

the hæmatic bodies and salts of the blood. Dose: 15 to 30 grains.

Hæmival.—A blood-iron albuminate, free from fibrin, urea, and all excretory products, and containing 0.25 to 0.30 per cent. of metallic iron in soluble and assimilable form. Does not coagulate when dissolved in hot water. Represents six times its weight of the fresh blood of a healthy bullock. Dose: 8 to 16 grains.

Hæmogallol.—A reddish-brown powder obtained by acting upon hæmoglobin with pyrogallol. A hæmatinic in anæmia. Dose: 4 to 8 grains, in cachet.

Hæmoglobin.—Prepared from defibrinated blood. Occurs in dark reddish-brown scales, also as powder or extract. Soluble in water. Dose: 1 to 2 drachms.

Hæmol is hæmoglobin reduced by the action of zinc dust. It is a brown powder. Dose: 2 to 8 grains (with as much sugar) in chlorosis. Various metallic and other compounds of it are made.

Hectine.—Sodio-arsenium benzo-sulphopara-aminophenylate. Dissolves readily in water, and solutions can be sterilised. Is less toxic than atoxyl. Dose: 15 minims of a 0.1-per-cent. solution. *Hectargyre* is a combination of hectine and mercury. Dose: 20 to 30 drops daily of a 0.1-per-cent. solution.

Hedonal is a white, crystalline powder, which chemically is methylpropylcarbinol-urethane. Almost insoluble in water, soluble in alcohol. Hypnotic. Dose: 15 to 30 grains.

Hegonon. — Ammonio-silver nitrate albumose (7 per cent. Ag). Readily soluble in water, does not coagulate albumin in solution. Used in 0.25-per-cent. injections for gonorrhœa.

Helcomen. — Basic bismuth dibromo-oxy-naphtholate. An insoluble, odourless, yellow powder. Used as a substitute for iodoform.

Helmitol is hexamethylenamine-anhydromethylene citrate, a white, crystalline powder, with acid taste, which dissolves in water to the extent of 1 in 14. A urinary antiseptic. Dose : 15 grains.

Hemisine. — A trade-name for the active principle of the suprarenal gland.

Heroin. — A diacetyl derivative of morphine, which occurs in the British Pharmacopœia, 1914, as diamorphine hydrochloride.

Hetocresol is metacresol cinnamate, a white, crystalline powder, insoluble in water, but soluble in ether. Used *per se* as a dusting-powder, or as an ether spray (3ss. to 3j.).

Hetol is a fancy name for sodium cinnamate, which is used in tuberculosis by intravenous injection. Dose : $\frac{1}{25}$ to $\frac{1}{2}$ grain.

Hetralin is dioxybenzol-hexamethylene-tetramine. It is a crystalline body, soluble in water (1 in 14). Used in cystitis as a urinary antiseptic. Dose : $7\frac{1}{2}$ to 15 grains.

Hexal. — Hexamine sulpho-salicylate. Similar in action to hexamine. Dose : 15 grains. Also called Neo-hexal.

Hexanatrine. — A mixture of

hexamine and sodium acid phosphate in 5-grain tablets.

Holocaine Hydrochloride. — The white, crystalline salt of a synthetic body (made by interaction of phenacetin and paraphenetidin). Used as a substitute for cocaine in ophthalmic practice as a 1-per-cent. solution in water. Its solubility is 1 in 45 of water.

Honthin. — A tannate of albumin. A tasteless and odourless powder used as an intestinal astringent. Dose : 10 to 30 grains.

Hopogan is a trade-name of magnesium peroxide, used in anæmia and in gastric troubles. Insoluble in water. Dose : 20 to 60 grains.

Hydraceticin and **Pyrocin** are the trade-names of acetylphenylhydrazine, which therapists regard as a poison rather than a therapeutic agent, although it was introduced as an antipyretic. Used as 10-per-cent. vaseline ointment in psoriasis.

Hydramyl. — A name for amyl hydride or rhigolene (an impure variety), the lightest fraction obtained in the distillation of petroleum spirit. Must be distinguished from Amylene Hydrate (*q.v.*).

Hydrargyrol. — Reddish-brown scales of mercury paraphenolsulphonate, containing 53 per cent. of the metal, and soluble in water and glycerin. An antiseptic of similar power to mercuric chloride, but non-caustic and does not coagulate albumen. See also *Asterol*.

Hydrocaffeine. — A derivative of caffeine, identical with 1, 3, 7, trimethyl uric acid. Needle-shaped

crystals, easily soluble in water and in sodium-benzoate solution. Dose : 8 grains as a diuretic.

Hydonaphthol.—A proprietary antiseptic in greyish laminæ, sparingly soluble in water (1 in 1,150) but dissolving freely in alcohol, glycerin, and fixed oils.

Hydropyryn.—Trade-name for sodium acetyl-salicylate. A white powder, soluble in water. Uses and doses as acetyl-salicylic acid.

Hydroquinine Hydrochloride. A white crystalline powder. The base contains two more hydrogen atoms than quinine. Useful in malaria and pneumonia in similar doses to quinine salts.

Hydroquinone $[C_6H_4(OH)_2]$, the well-known photographic developer, has antipyretic and antiseptic properties. Dose : 1 to 5 grains. Chiefly used as a lotion in ophthalmic practice, and as an injection in gonorrhœa : strength 4 to 8 grains per ounce.

Hydroxylamine Hydrochloride $(NH_2.OH.HCl)$.—Colourless crystals, easily soluble in water, alcohol, and glycerin. For lupus, psoriasis, pruritus, and other skin-diseases ; resembles chrysarobin and pyrogallol in action. The lotion is made $\frac{1}{2}$ to 2 grains per ounce.

Hydrozone.—A strong and stable solution of hydrogen peroxide.

Hypnal (Monochloral Antipyrin).—Colourless, odourless, and tasteless crystals. Used as a hypnotic in doses of 15 to 30 grains in an ounce of aromatic water.

Hypnoacetin is acetophenon-acetyl-para-amidophenol, a solid in

scales, insoluble in water, soluble in alcohol. Antipyretic and slightly hypnotic. Dose : 3 to 4 grains.

Hypnogen.—A trade-name for diethyl-malonyl-urea.

Hypnone (Acetophenone) is a colourless fluid, sparingly soluble in water and more soluble in alcohol. Dose : 3 to 10 minims as a hypnotic. Being caustic, should be dispensed in gelatin capsules, each containing 1 minim of hypnone dissolved in 9 minims of almond oil.

Hyroferment. — A trade-marked name for colloidal mercury.

Hyrgol.—The trade-name of 'colloidal mercury,' a water-soluble compound containing nearly four-fifths of its weight of the metal. Has the medicinal properties of the metal. Dose : $\frac{1}{4}$ to $\frac{3}{4}$ grain in pill ; subcutaneous injection, 1 to 2 per cent. ; ointment, 10 per cent.

Iatrevin.—A condensation-product of menthol and isobutyl phenol. Used as an inhalation in lung-affections.

Iatrol, or Jatrol.—An antiseptic powder (oxyiodomethylanilide) used like iodoform.

Ichthalbin is a combination of ichthyol and albumin. A brown, odourless powder, used as a dusting-powder externally in eczema and other skin-affections.

Ichthargan.—A brown, odourless powder combining 30 per cent. of silver as ichthyol-sulphonate. Soluble in water, glycerin, and dilute alcohol. Used in gonorrhœa as an injection, $\frac{1}{8}$ to 1 grain per ounce. Should be dispensed in amber-glass bottles.

Ichthoform is a compound of ichthyol and formaldehyde, and is a brown-black, odourless powder, insoluble in water. Externally is used as a substitute for iodoform; internally, in intestinal disorders, especially of tuberculous origin. Dose: For children, 4 to 8 grains; for adults, 15 to 30 grains.

Ichthyol (Ammonium Ichthyolate).—A dark-brown and thickish fluid, insoluble in water, but soluble in alcohol and ether. Internally ichthyol is given in doses of 4 to 20 minims, but it is much more used externally as an ointment with lanoline, and in other forms. For this purpose the ammonium ichthyolate is generally used, but sodium ichthyolate is preferable for pills, as that salt is much thicker than the ammonium one. The best pill of all is made with magnesium ichthyolate. This salt can be made by heating together 120 grains of ammonium ichthyolate and 15 grains of freshly-burnt magnesia (made into a paste with 2 drachms of water). Use the heat of a water-bath. A light chocolate, powdery mass is obtained, which only requires a little water to make into a suitable pill-mass. Two grains of the magnesium salt equals 3 grains of ammonium ichthyolate. Zinc ichthyolate is preferred for injections and the like. The following are compounds or preparations of ichthyol: *Ichtharsol* (arsenico-ammonium ichthyolate); *Ichthermol* (mercuric sulpho-ichthyolate, containing 24 per cent. Hg, antiseptic); *Ichthosin* (ichthyol and eosin mixture); *Ichthosol* (com-

bination of ammonium ichthyolate and guaiacol carbonate; *pills*, each contains ichthyol gr. iss. and creosotal, gr. ss.); *Ichthyod* (lin. ichthyoloiodicum comp.); *Ichthyocreosote* (ichthyol 2, creosote 2, eucalyptol 1, and an excipient); *Ichthyolidin* (piperazine ichthyolate, dose 4 grains in pastilles); *Ichthyol salicyl* (a hygroscopic mixture of ichthyol with 25, 33, or 50 per cent. of sodium salicylate).

Igazol.—A combination of paraform, terpin hydrate and iodoform, used for vaporising in the bedrooms of tuberculosis patients, so as to saturate the atmosphere with formaldehyde.

Intestin is the trade-name of a compound of bismuth oxide, naphthalene, and benzoic acid. Dose: 8 to 15 grains as an intestinal antiseptic. *Intestinol* is an antiseptic powder, consisting of sodium benzoate and carbonate.

Iodalbacid.—A slightly yellow powder, which contains 10 per cent. of iodine combined with albumin; soluble in water. Dose: 15 grains.

Iodalbin.—An iodo-proteid compound (21.5 per cent. I). Soluble in alkali solutions.

Iodalgin.—An odourless, tasteless, and soluble substitute for iodoform, containing 50 per cent. of iodine.

Iodargirum.—Stated to be iodo-cacodylate of mercury, for hypodermic and internal use. *Iodargyr* is a dusting-powder, and is described as an organic compound of iodine and mercury.

Iodglidin.—The trade-name of a brown powder, obtained by the action of iodine on glidin, and marketed in tablets, each of which equals iodine 0.05 gramme. Dose: One or two tablets in syphilis, scrofula, asthma, and arteriosclerosis.

Iodil.—White, tasteless scales of the hydriodide of an organic base, containing 35.5 per cent. of combined iodine. Dose: Same as the alkaline iodides.

Iodine Terchloride.—Is supplied in 15-grain tubes, sufficient to make 40 ounces of lotion (about 1 in 1,000), which is a powerful antiseptic. It is also useful as an anti-fermentative in dyspepsia, and as an injection in gonorrhœa.

Iodipin (Iodinol).—A yellow fluid consisting of sesame oil combined with 10 per cent. of iodine. Is used in place of alkaline iodides. Dose: ʒj. to ʒiv., emulsified like an oil, and flavoured with peppermint or other aromatic, but preferably taken floating on water.

Iodival.—Mono-iodo-iso-valerianyl-urea, a crystalline compound containing 47 per cent. of combined iodine. A substitute for alkaline iodides, having a special affinity for oily liquids, thus passing from watery solutions into oily liquids, consequently of value in brain syphilis. Dose: 5 grains.

Iodofan.—A reddish crystalline powder, monoiododioxybenzoformaldehyde $[C_6H_3I(OH)_2.HCOH]$, used as a surgical antiseptic like iodoform.

Iodoferratin.—An albuminous

compound of iodine and iron, containing 6 per cent. of each. Dose: 20 grains or more.

Iodoformal is the ethyl iodide of iodoformin. Resembles iodoform in properties.

Iodoformin is an iodoform-substitute (see *Formin*).

Iodoformogen.—An albuminate of iodoform (10 per cent. CHI_3), a brownish-yellow powder, much lighter in bulk than iodoform and utilised on that account for the same purposes.

Iodogallicin.—A compound— $C_6H_2.CO_2CH_3.OH.OBi.OHI$ —of gallicin and bismuth oxyiodide, occurring as a light, amorphous, dark-grey powder, which is decomposed by acids, alkalies, and water. Is an antiseptic like iodoform.

Iodol.—A tetraiodopyrrol— C_4I_4NH

—which occurs as a pale-brown powder and is insoluble in water, but soluble in alcohol and fixed oils (1 in 15). A substitute for potassium iodide. Dose: 2 to 8 grains per day. Externally it is used like iodoform, the ointment being 1 to 5.

Iodolen.—An iodol-albumen, insoluble in water. The external preparation contains 36 per cent. of iodol, and the internal about 10 per cent. Dose: 15 to 30 grains.

Iodolin is chinoline chlormethylchloriodide ($C_9H_7NCH_2Cl.ICl$), a yellow powder, insoluble in water, but soluble in alcohol, and used as an iodoform-substitute.

Iodolysin.—A compound of 43 per cent. of thiosinamin and ethyl iodide (=I 47 per cent.).

Dose of solution : 30 to 60 minims, hypodermically 15 minims; also used externally as a pigment.

Iodomenin.—Trade-name of iodo-bismuth albuminate, a tasteless powder, given in place of alkaline iodides. Dose : 5 to 15 grains.

Iodophenin.—An iodo-phenacetin ($C_{20}H_{25}I_3N_2O_4$). It is a brown powder, containing 52 per cent. of iodine. Used externally like iodoform, internally in acute rheumatism. Dose : $7\frac{1}{2}$ grains.

Iodopyrin ($C_{11}H_{11}IN_2O$).—A colourless, crystalline body, soluble in alcohol and in hot water. Antiseptic, analgesic, and alterative in action. Dose : 5 to 15 grains.

Iodose.—A reddish powder formed by the action of iodine on a nucleo-proteid (I = 10 per cent.). Dose : 5 to 20 grains.

Iodosin.—An iodised albumen (15 per cent. I), said to be four times as active in myxœdema as alkaline iodides, therefore given in a fourth the dose.

Iodo-theobromine is theobromine and sodium iodosalicylate (theobromine 40 per cent.). Dose : 3 to 8 grains as a diuretic and cardiac stimulant.

Iodothyryn, or thyroiodin, is a preparation of the thyroid gland (I in 1). Dose : 5 grains thrice daily.

Iodpeptide.—A light-yellow, fluorescent fluid obtained by peptonising albumin and iodising the resulting solution. Put up in ampoules of 5 c.c.

Iohydrin is diiodo-isopropyl alcohol. Used in 1-to-3 ointment for

treatment of bronchial and rheumatic affections.

Iothion (sometimes spelt jothion) is diiodo-hydroxy propane ($C_3H_5I_2OH$), sp. gr. 2.4–2.5; a yellowish, oily liquid used for the administration of iodine by the skin, being readily absorbed.

Iothionol.—Veterinary iothion (25 per cent.). Maximum dose : 1 gramme (15 grains) per kilo. (2 lb.) of body-weight.

Isarol.—A substitute for ichthyol, made by sulphonating a shale distillate. Is a brownish-red, thick liquid, which mixes clear with water.

Iso-butyl Nitrite is the chemically pure form of amyl nitrite.

Isoform.—Para-iodanisol, an iodoform substitute. The powder consists of equal parts of isoform and calcium phosphate, and is given in doses of 2 grains in capsule thrice daily, as an intestinal antiseptic. Isoform paste is a mixture of isoform with glycerin.

Istizin.—A trade-name for di-oxyanthraquinone in yellow scales. Given in 5-grain tablets as a purgative of the phenolphthalein type.

Itrol.—The fancy name for silver citrate. A white powder, almost insoluble in water (1 in 3,800). Is used in the treatment of gonorrhœa and, externally, as an iodoform-substitute. The injection is made 1 grain to 10 ounces of water, the gargle 1 grain to 24 ounces, and the ointment 8 grains to 1 ounce of benzoated lard. Above 30° C. solutions decompose.

Jatrevin.—See *Iatrevin*.

Jequiritol.—A 50-per-cent. ste-

rilised solution of abrin, of which one drop is put into the eye in cases of corneal opacity.

Kalmopyrin.—Calcium acetyl-salicylate, readily soluble in water. Dose like the acid.

Kamalin.—The bitter principle of kamala, in reddish crystals. An anthelmintic.

Kelene is ethyl chloride.

Kephalidon and **Kephalosan.** Names for amino-acetparaphenetidin-caffeine hydrobromide, a white powder given in 5-grain doses for headache.

Kharsin.—Sodium 3-methyl-4-aminophenylarsonate. Contains As 23·7 per cent. Soluble in water. Proposed as a remedy for malaria, sleeping-sickness, and syphilis in 1-grain doses hypodermically.

Kineurin.—Trade-name for quinine glycerophosphate. Dose: 1 to 5 grains.

Kosin ($C_{31}H_{35}O_{10}$).—The crystalline principle of kousso. Yellow in colour; soluble in alcohol, ether, and chloroform, not in water. Dose: 20 to 30 grains, followed by a dose of castor oil. There is also an amorphous form. Dose: 15 to 60 grains.

Kresatin, or metacresol acetic ester, is a colourless oil miscible with oils and liquid paraffin, and used in such media, or alcoholic solution, as a nasal and throat spray.

Kryofin (methoxyacetphenetidin).—An analgesic and antipyretic powder, sparingly soluble in water. Dose: 5 to 15 grains.

Lactalexin.—A proprietary preparation of spermin, thymine, thyroindin, and nucleinic acid, recommended for rickets, scrofula, and nervousness of children.

Lactanin, the trade-name of bismuth lacto-tannate, a yellow powder, insoluble in water. Dose: 8 grains thrice daily for diarrhoea.

Lactobacillin.—A preparation of the lactic-acid bacillus in the form of tablets.

Lactol is beta-naphthol lactate, an intestinal antiseptic. Dose: For children, 4 to 8 grains; adults, 15 grains, in cachets.

Lactophenin.—A homologue of phenacetin, the acetic radicle being replaced by the lactic. Resembles phenacetin in physical and therapeutic properties, but is not so depressing. Dose: 5 to 15 grains.

Lactucin.—The bitter principle ($C_{11}H_{11}O_4$) of French lactucarium. In white scales, soluble in alcohol, slightly soluble in water. Hypnotic and sedative. Dose: 1 to 5 grains.

Largin, or silver albuminate, is a greyish powder containing 10·5 per cent. of silver, and soluble 1 in 9 of water. Used as an injection (1 grain per ounce) in gonorrhoea, and in ophthalmia (5 per cent.).

Laxoin.—A preparation of phenolphthalein.

Lecithin (Ovo), the phosphoric principle of egg-yolk and the brain, is substantially a distearo-glycerophosphate of choline. Occurs as a yellowish wax, soluble in ether and chloroform, less soluble in alcohol, and insoluble in water. A nerve-tonic. Dose: 2 to 5 grains

per se in pill, or subcutaneously half as much dissolved in sterilised oil.

Lenicet.—A basic aluminium acetate, used as a dusting-powder.

Lenigallol.—Triacetate of pyrogallol. Is a white powder, insoluble in water, milder in action than pyrogallol, and does not stain. The ointment is made with lanoline, 2 to 20 grains per ounce.

Lenirobin.—Tetracetate of chrysarobin, which is milder in action than chrysarobin. Soluble in acetone and chloroform.

Lentocalin.—Tablets containing the components of the crystalline lens. Used in senile cataract.

Leucofermantin.—Blood-serum of the horse whose antiferment-power has been increased by immunising with trypsin. Recommended for the treatment of boils.

Levurine.—A greyish-white powder made from beer-yeast, and used in acne and similar skin troubles, in doses of a teaspoonful thrice a day.

Liparin.—A proprietary substitute for cod-liver oil, consisting of a solution of 6 per cent. pure oleic acid in olive oil.

Lithium Benzoate.—A white, crystalline powder, soluble in water and alcohol. Dose: 5 to 20 grains in gout.

Lithium Bitartrate is known as *tartarlithin*. Dose: 5 grains.

Lithium Iodide.—A coarse white powder, soluble in water. Dose: 1 to 5 grains. The *iodate* resembles it in appearance and physical properties. Dose: 2 to 3 grains. Other unofficial lithium salts used

medicinally are: *Phosphate*, dose 10 to 30 grains; *salicylate*, dose 10 to 30 grains; *sulphoichthyolate*, dose 3 to 10 grains (in pill or capsule); *sulphate*, dose 10 to 30 grains; *valerianate*, dose 5 to 15 grains; and *vanadate*, dose $\frac{1}{2}$ grain three times a day. They are all soluble salts.

Loretin is an iodo-oxy-quinoline-sulphonate—



It occurs as a yellow, crystalline powder, soluble in water and alcohol. Is used as an antiseptic like iodoform. *Loretin bismuth* is also used internally in intestinal tuberculosis in 8-grain doses.

Losophan (tri-iodo-metacresol, $\text{C}_6\text{H}_3\text{I}_3\text{OHCH}_3$) is a crystalline, colourless solid, insoluble in water, soluble in ether, chloroform, and fixed oils, and containing 80 per cent. of iodine. Substitute for iodoform.

Luminal.—Phenyl-ethyl barbituric acid and its sodium salt, *Luminal sodium*, are hypnotics. Dose: 3 to 5 grains. The sodium salt is used hypodermically.

Lupetazin.—The trade-name for dimethylpiperazine, a uric-acid solvent like urotropine. Occurs in white crystals, soluble in water and alcohol. Dose: 2 to 8 grains.

Lycetol (dimethyl - piperazine tartrate).—A white powder, soluble in water. Is a good solvent for uric acid, and relieves gouty symptoms. Dose: 4 to 8 grains, preferably in aerated water, and with calcined magnesia \mathfrak{Dj} . *Lycitol* is a distinct product, being liq. creosol. saponat.

Lycorine ($\text{C}_{33}\text{H}_{32}\text{N}_2\text{O}_8$) is the

alkaloid of *Lycoris radiata*, and possesses emetic and purgative properties.

Lygosin.—Ortho-coumaric ketone. A yellow crystalline substance used as an antiseptic. *Lygosin-quinine* is the quinine compound (used externally in powder, solution, or gauze), and *Lygosin-sodium* a combination used for venereal troubles in 1 to 3 per cent. solutions.

Lysargin.—A colloidal - silver preparation in steel-coloured scales, soluble in water.

Lysidine is the name given to methyl-glyoxalidine and its tartrate. Used for uric-acid disorders. Dose : 15 grains, in aerated water.

Lysoform.—A surgical antiseptic represented by liq. formaldehydi saponatus, B.P.

Lysol.—A surgical-antiseptic solution represented by liq. cresol. saponatus, B.P.

Malakin, or salicyl-paraphenetidin, occurs in yellow crystals, insoluble in water. Dose : 8 grains in acute rheumatism, 15 grains for tapeworm.

Maretin is metatolyl carbamate [$C_6H_4 \cdot CH_3 \cdot (NH)_2 \cdot CONH_2$]. White crystals, sparingly soluble in water, and less so in alcohol. A strong antipyretic. Dose : 2 to 5 grains.

Marrubin.—The trade-name of a preparation of malt and red bone-marrow. *Marrubiin* is an active constituent of horehound.

Massolin.—A pure culture of *Bacillus bulgaricus* (Massol), used, by direct application, for the treatment of suppurative conditions,

especially in nasal and aural affections.

Meconarcein.—The trade-name of a morphine-free opium preparation, said to owe its hypnotic properties to narceine and other constituents of the drug preserved with camphor.

Medinal * Soluble.—Monosodium diethylbarbiturate, a white, crystalline powder. Being soluble 1 in 5 of cold water, is preferred to the acid (veronal) in the same doses.

Meligrin.—The trade-name for a mixture of dimethyloxychinizine and methylacetamide, a white powder with bitter taste, having antipyretic and antimigraine properties.

Melioform.—A liquid containing 25 per cent. of formaldehyde and 15 per cent. of aluminium acetate. Used as a sterilising-fluid in $\frac{1}{2}$ -per-cent. solution.

Menthospirin.—Capsules of acetyl-salicylic menthol ester, each containing 0.25 gramme, and used for catarrh.

Mercochinol.—Mercury oxychinolsulphonate. A heavy, yellow powder, slightly soluble in water. Used externally and by injection in syphilis.

Mercuriol.—An amalgam of mercury (99.4 per cent.) with aluminium and magnesium. Must not be confused with

Mercuriol, a brownish-white powder consisting of 10 per cent. of mercury in combination with nucleinic acid. A specific in gonorrhœa and other venereal diseases. Used as an injection ($\frac{1}{2}$ to 2 per

cent.), and internally in doses of $\frac{1}{8}$ to 3 grains thrice daily.

Mercury Compounds.—A considerable number of preparations of mercury have, of recent years, been added to therapeutics. These are generally of a nature intended to have the maximum effect upon the disease and the minimum effect upon the organism. Practically all of them are anti-syphilitic medicines. We give the characteristics and doses in the briefest possible space. Some older preparations are separately mentioned:—

Hydrargyri Albuminas.—A greyish-white powder containing 0.4 per cent. of the metal. Used as dusting-powder, 1 grain to the drachm.

Hydrargyri Amido-propionas.—White crystals, soluble in water. Dose: $\frac{1}{20}$ to $\frac{1}{10}$ grain, in pill.

Hydrargyri Asparaginas.—Yellowish powder, insoluble in water. Dose: $\frac{1}{10}$ to $\frac{1}{5}$ grain, in pill or subcutaneously.

Hydrargyri Benzoas.—White crystals, easily soluble in sodium-chloride and ammonium-benzoate solutions. Dose: $\frac{1}{30}$ to $\frac{1}{10}$ grain, in pill; subcutaneously, 15 minims of solution containing the benzoate 3 grains, sodium chloride 3 grains, and water 1 ounce.

Hydrargyri Bibromidum (mercuric).—Resembles corrosive sublimate. White scales, soluble in water. Dose: $\frac{1}{30}$ to $\frac{1}{10}$ grain, in pill; externally, 4 grains per ounce of ointment.

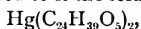
Hydrargyri Bromidum (mercurous).—Resembles calomel. In-

soluble in water. Dose: 1 grain, increasing to 10 grains, per day.

Hydrargyri Cacodylas.—White, hygroscopic crystals, soluble in water and alcohol. Dose: $\frac{1}{6}$ grain, subcutaneously.

Hydrargyri Carbolas.—A greyish-white to red-grey powder, soluble in ether. Dose: $\frac{1}{6}$ to $\frac{1}{3}$ grain, in pill.

Hydrargyri Cholas, or *Mergal*, has assigned to it the formula



and is a yellowish-white powder, insoluble in water, but soluble in salt solution. For intermittent fever, in 10-grain doses with food.

Hydrargyri Diiodosalicylas.—A yellow, amorphous powder, used for intramuscular injections, 1 to 9 of liquid paraffin.

Hydrargyri Gallas.—A greyish-brown, amorphous powder, insoluble in water. Dose: $\frac{1}{2}$ to 1 grain in pill with as much pulv. cinchonæ and glycer. tragacanth.

Hydrargyri Glycocholas (amido-acetate).—Supplied in 1-per-cent. solution. Dose (subcutaneously): 15 minims.

Hydrargyri Hermocarbolas (hermophenyl).—A white, amorphous powder, containing 40 per cent. of Hg, 'obtained by dissolving the oxide of mercury in bisulphite of carbolic sodium. It has the formula $\text{C}_6\text{H}_5\text{O}(\text{SO}_3\text{Na})_2\cdot\text{Hg}$.' Very soluble in water. Dose: 10 to 30 grains, subcutaneously.

Hydrargyri Imido-succinas.—Mercurisuccinimide, a white, crystalline powder, soluble in water. Dose: $\frac{1}{5}$ grain, subcutaneously.

Hydrargyri Lactas.—A white, crystalline powder, sparingly soluble in water. Dose : $\frac{1}{2}$ grain, in pill or subcutaneously.

Hydrargyri Naphthol-acetas.—A yellowish powder, soluble in dilute alkalis. Dose : $\frac{1}{2}$ to 1 grain.

Hydrargyri Beta-naphtholas.—A greyish-white powder, insoluble in water. Used in typhus. Dose : 1 grain.

Hydrargyri Oxycyanidum.—A white or slightly yellowish, crystalline powder, soluble in hot water, sparingly in cold. A strong antiseptic in $\frac{1}{2}$ to 2 per cent. solutions.

Hydrargyri Resorcino-acetas.—A yellowish, crystalline powder, insoluble in water and alcohol. Used subcutaneously only, the injection consisting of the salt $\mathfrak{z}\text{j}$., liquid paraffin $\mathfrak{z}\text{j}$., and anhydrous lanoline gr. xxiv. Dose of this, warmed to 80° F., 15 minims.

Hydrargyri Salicylas.—A white powder, soluble in dilute alkalis and saline solutions. Dose : $\frac{1}{3}$ grain, in pill ; ointment and dusting-powder, 1 per cent. ; urethral injection, gr. j. to acacia mucilage $\mathfrak{z}\text{iiss}$. and water $\mathfrak{z}\text{iiiss}$. (15 minims for an injection).

Hydrargyri Succinimidum.—Glistening crystals, used subcutaneously in 1 to 2 per cent. solution. Dose : 15 minims.

Hydrargyri Tannas (mercurous). A greyish-green powder, insoluble in water. (It is called *hydrargotin* by one firm.) Dose : 1 to 3 grains, in pill or tablet.

Hydrargyri Thymolo-acetas.—A white powder, insoluble in water.

Dose (subcutaneously) : 1 grain (with or without the same of cocaine) in liquid paraffin or glycerin *once a week*. Internally $\frac{1}{2}$ to 1 grain with potassium iodide in consumption.

Hydrargyri Tribromophenol-acetas is used similarly to and is like the last-named.

Hydrargyroseptol.—A mixture of chinosol mercurate with sodium chloride. Soluble in water. Used as a vaginal wash.

Hydrargyrum Peptonatum.—A 1-per-cent. solution is made by dissolving 1 part of mercuric chloride in 20 parts of water, and adding a solution of 3 parts of peptone in 10 parts of water. Collect and wash the precipitate, which dissolve in a solution of $\frac{3}{4}$ part of sodium chloride in 50 parts of water. Make up to 100 parts with water. Dose (subcutaneously) : 15 minims. The dry peptonate is a yellowish-brown powder containing 10 per cent. of the metal, and soluble in water.

Mercury Oleo - brassidate.—A combination of mercury with oleic and erucic acids, containing 30 per cent. of Hg. A clear yellow jelly, used in syphilis by inunction of 18 grammes ($\mathfrak{z}\text{ivss}$.) daily.

Mergal.—Mercuric cholate, a greyish-yellow powder exhibited in 1-grain capsules with 2 grains of tannalbin for syphilis.

Mergandol.—A glycerin solution of sodio-mercuric glycerinate. Used in doses of 2 c.c. by intramuscular injection.

Mescaline.—One of the alkaloids of *Anhalonium Lewinii*. The

sulphate is obtainable should it be needed as a therapeutic agent.

Mesotan. — Salicyl-methoxymethyl ester. A yellow oily liquid. Used as an external application for rheumatism and kindred affections, generally mixed with olive oil or vaseline.

Methacetin (para-oxymethylacetanilide).—A colourless, crystalline powder, odourless, but having a saline, bitter taste. Sparingly soluble in water. Therapeutically like acetanilide. Dose: 4 to 8 grains, in powder.

Methonal is an analogue of sulphonal, and possesses the same therapeutic properties. *Methanal* is another name for formaldehyde.

Methyl Salicylate. — Artificial oil of wintergreen.

Methylal (Formal).—This is methylene-dimethyl ether, a colourless and highly volatile fluid, soluble in water, alcohol, and fixed oils. Dose as a hypnotic: 60 minims. Is also used externally as a local anæsthetic in the form of ointment or oleaceous liniment (1 in 8). Is an antidote to strychnine.

Methyl-aspirin is said to be a better remedial agent than acetylsalicylic acid. It is a white, crystalline compound, and is given in the same doses as aspirin.

Methylene Blue.—Methylthionine hydrochloride, a crystalline solid, soluble 1 in 50 of water. Antirheumatic, antineuralgic, and antivereal. Dose: 2 to 4 grains, in capsules; also in 1-in-2,000 injections.

Metramine.—A trade-name for hexamethylene-tetramine.

Microcidine.—A whitish powder, consisting chiefly of sodium betanaphtholate, and, in 3-per-cent. aqueous solution, recommended as an antiseptic.

Migrainin contains antipyrin 85, caffeine 9, and citric acid 6 parts. Dose: 15 grains as an antineuralgic.

Migrophen.—Quinine sulphate with 10 per cent. of lecithin, given in 4 to 8 grain doses.

Monochlorophenol (Para).—Colourless crystals, soluble in ether and alkali solutions, slightly in water. A strong antiseptic, used in the pure state for applying to lupus, but otherwise in 1 to 2 per cent. solutions. For inhalation in bronchitis and phthisis, 15 to 30 drops.

Monotal.—Guaiacol methylglycolate. A colourless, aromatic, oily fluid, soluble in alcohol, ether, chloroform, and fixed oils. Used externally in neuralgia, pleurisy, rheumatism and other painful ailments, to the extent of a drachm per day. Internally in doses of 1 to 5 grains.

Morphosan.—Morphinemethylbromide, $C_{17}H_{19}O_3N.CH_3Br.H_2O$. In crystalline needles, soluble 1 in 20 of water. Given hypodermically in doses of $\frac{1}{12}$ to $\frac{1}{6}$ grain as a cure for the morphine-habit, or as a hypnotic and sedative.

Morrhuin ($C_{19}H_{17}N_3$), a base obtained from cod-liver oil, is a thick oil soluble in alcohol and ether. Dose (for children): 5 to 10 drops.

Mucin is a yellowish powder obtained from bile and soluble in water. Dose: 10 grains with as much sodium bicarbonate.

Mucoferrin.—A proprietary ferric preparation in powder, stated to be obtained from mucin, the mucoid body of snails and the vitreous body of the ox by precipitation with ferric chloride. Prescribed for anæmia and chlorosis.

Mucusan.—A proprietary antiseptic in white powder, which is said to be 'Zinc diboro-ortho-benzoate.' Marketed in half-gramme tablets, which are used for making injections (gr. j. to gr. v. per oz.) for gonorrhœa and leucorrhœa, and as a nasal douche.

Mydriazine.—A trade-name for atropine methyl-bromide, used (1-per-cent. solution in water) in eye-affections as a mydriatic.

Mydrine is a mixture of ephedrine and homatropine hydrochlorides. Is a white powder, soluble in water. Two to 5 drops of the 10-per-cent. solution is instilled into the eye as a mydriatic.

Naftalan is a greenish-black, oily distillate from Armenian petroleum, which is used like *huile de cade* and other tarry compounds for skin-diseases.

Naphthalin.—Colourless, crystalline scales, insoluble in water and sparingly soluble in cold alcohol and fixed oils, but readily soluble if heated. Is used internally for gastric disorders (2 grains, cautiously increased), for tapeworm (15 grains, followed by castor oil), and exter-

nally in skin-diseases as an ointment (1 to 15).

Naphthol (Alpha).—Colourless crystals, insoluble in water, soluble in alcohol. An intestinal antiseptic in diarrhœa and dysentery. Dose: 15 grains, with castor oil. (See also *Betol*.)

Narceine.—One of the alkaloids of opium. Has been recommended as a hypnotic and sedative in doses of $\frac{1}{2}$ to 2 grains (hypodermically). The hydrobromide and hydrochloride are the best salts to use, being quite soluble in water and alcohol.

Narcophin.—A trade-name for meconate of morphine (=31 per cent.) and narcotine.

Narcotile is methyl-ethylene bichloride, and is recommended as a general anæsthetic. Supplied in tubes like ethyl chloride.

Narcotine.—An alkaloid of opium, said to have a specific action in malaria resembling quinine. Dose (of the hydrochloride): 2 to 4 grains or more, but not exceeding 20 grains per day.

Nargol is silver nucleinate, a brownish-white powder, soluble in water, and containing 10 per cent. of silver. Used in 1 to 2 per cent. solution as an injection in venereal complaints, in 10 to 20 per cent. solution for corneal ulcers, and weaker in cases of milder inflammations.

Nastin.—A crystalline fat derived from leprosy bacilli, which in combination with benzoyl chloride (*Nastin B*) has been recommended by Dr. Deyke Pascha and Reschad Bey for subcutaneous injection in

leprosy, the solutions being designated B₀, B₁, and B₂ according to strength.

Neoform. — Oxy-bismuth tri-iodo-phenol. A yellow, amorphous powder, insoluble in water, which is used as a dusting-powder for indolent ulcers, and similar affections. *B. Neoform* is the methyl ester of para - amido - meta - oxy-benzoic acid.

Neo-pyrenol. — A proprietary remedy for cough, rheumatism, &c., combining thymol, para-dioxy-benzol, Siam benzoin, sodium benzoate, and sodium oxybenzoate.

Neopyrin. — Valeryl - amido - antipyrin, in white crystals with a bitter taste, slightly soluble in water, soluble in chloroform. Dose, as an antipyretic, 5 to 15 grains.

Neraltein. — Sodium para-ethoxyphenylamidomethane sulpho-nate. White crystalline scales, soluble in water, and having a sweet taste. An analgesic, antipyretic, and antineuralgic remedy in doses of 5 to 15 grains, three or four times a day.

Nervocidine is said to be the hydrochloride of an alkaloid isolated from an Indian plant called gasubasu. It is a yellow, amorphous, hygroscopic powder, soluble in water, and less so in alcohol and ether. It is a powerful local anæsthetic, used in dental practice in 1-in-1,000 solution.

Nesain. — A combination of arsenic and protein. A yellow powder = As 10 per cent. Used in 10-per-cent. solution as a hypodermic injection in carcinoma.

Neurodin is acetyl - para-oxy-phenyl-urethane, and occurs in colourless crystals, slightly soluble in water. An antipyretic and antineuralgic. Dose: 5 to 15 grains. Do not confound with *Neurosin* (caffeine and nitroglycerin tablets).

Neuronal. — Bromo - diethyl - acetamide, in colourless crystals, sparingly soluble in water (4 grains per ounce), easily soluble in spirit, and given in 10 to 25 grain doses as a hypnotic and sedative.

Neuroton. — Spermio - nuclein salicylate. Marketed as sterile solutions for subcutaneous injection, as tablets, and as capsules in combination with strychnine nitrate ($\frac{1}{64}$ gr.) and iron arsenate.

Neutralon. — An aluminium silicate for the treatment of gastric ulcers, in doses of a half to a whole teaspoonful before meals. Supposed to protect the affected part.

Nevraltein. — See *Neraltein*.

Nirvanin is the name applied to a variety of orthoform occurring in white prisms and soluble in water. Recommended as a substitute for cocaine to produce local anæsthesia. For the eye a 2-per-cent. solution is used. Dose: 1 to 2 grains, or more, hypodermically.

Nizin. — Trade-name for zinc sulphanilate, a venereal antiseptic.

Nosophen is tetraiodophenol-phthalein. A yellow powder, insoluble in water; used in place of iodoform, and internally in doses of 5 grains or more.

Novaspirin. — Disalicyl-anhydromethylene citrate. Given similarly to aspirin, in 15-grain doses

for influenza, neuralgia, and the like.

Nuclein.—This term is applied to nitrogenous and phosphorus compounds occurring in the organism. They consist of nucleinic acid and a basic substance of a complex nature (albumen). They are insoluble in alcohol, but soluble in caustic alkalies, and resist peptic digestive agents. Nuclein derived from yeast is principally used. Dose : $7\frac{1}{2}$ grains. Several 'salts' of it are mentioned herein. *Nucleol* is a pure nuclein.

Odyli. — Terpin-resorcinat, a yellowish oil of pleasant odour, made by warming together molecular proportions of resorcin and terpin, soluble in alcohol, ether, and oils. Given in gelatin capsules in affections of the bladder.

Omal is the trade-name of Trichlorophenol (*q.v.*).

Omorol. — An insoluble silver protein used as an antiseptic.

Oresol (Oreson), or guaiacal glycerate, is recommended as a mild form of the base, and is soluble in water (1 in 40) and in alcohol. Dose : 3 to 6 grains. (See also *Guaiaamar.*)

Orexin.—A synthetic appetiser. The *hydrochloride* is a colourless and odourless crystalline powder, with a biting and bitter taste. The *tannate* is tasteless, and insoluble in water. Dose : 4 to 8 grains.

Orphal or **Orphol.** — Betanaphthol bismuth. Used as an intestinal antiseptic for children in doses of 4 to 8 grains.

Orsudan. — The trade-name

for sodium 3-methyl-4-acetylaminophenylarsonate, employed in malaria, syphilis, sleeping-sickness, pernicious anæmia, and skin-diseases. The syphilis treatment consists of ten intramuscular injections. Orsudan is soluble in 4 parts of water and contains 25·4 per cent. of arsenic. Dose : 1 to 5 grains.

Orthoform is the methyl ester of para-amidomethahydroxybenzoic acid. ('New' orthoform is meta-amido-para-oxybenzoic acid methyl ester.) A white powder, slightly soluble in water. Used externally as an anodyne for painful wounds and burns, and internally (the hydrochloride), in doses of $7\frac{1}{2}$ to 15 grains, as an anodyne.

Ostauxin. — Calcium parancleinate. Dose : 8 to 15 grains as a tonic.

Ovaraden. — A brownish and tasteless powder, composed of ovarian extract, 1 part being equal to 2 parts of fresh ovaries. Marketed in tablets each containing 4 grains. *Ovaradentriferrin* tablets contain also $2\frac{1}{2}$ grains of triferrin.

Ovogal.—A greenish - yellow powdery compound of albumen with glycocholic and taurocholic acids, given in doses of a teaspoonful for liver-troubles accompanied by constipation.

Oxyacanthine.—The sulphate of this alkaloid of *Berberis vulgaris* is a white, crystalline powder, soluble in hot water. Used in canine treatment only, the hypodermic dose being $1\frac{1}{2}$ to 3 grains.

Oxycamphor, or camphoroxime.

A white, crystalline substance obtained by replacing a hydrogen atom in camphor by hydroxyl, and used in 5-grain doses to relieve difficulty of breathing in bronchitis. Soluble 1 in 50 of water. Commercially is supplied in 50-per-cent. alcoholic solution as *Oxaphor*. Dose: 10 to 20 minims.

Oxygar. — A combination of hydrogen peroxide and agar-agar ($= \text{H}_2\text{O}_2$ 10 per cent.). Dose: 15 grains three times a day, before meals, in certain gastric and intestinal affections.

Oxyntin. — A preparation of protein and hydrochloric acid (5 per cent.). Dose: 5 to 15 grains (in place of pepsin).

Oxysparteine. — An oxidation-product of sparteine. The hydrochloride and sulphate (white crystals) are soluble in water. Used as a heart-stimulant. Dose: $\frac{1}{2}$ to 1 grain, subcutaneously.

Pantopon. — A proprietary preparation of the alkaloids of opium as hydrochlorides. Ten of it equals 5 of morphine and 4 of the other alkaloids. It is also known as *Omnopon*.

Papaverine and its hydrochloride are used as a sedative and in the diarrhoea of children. The hydrochloride is soluble in water. Dose: $\frac{1}{8}$ to 1 grain, according to the age of the child.

Parabismuth. — Bismuth and calcium para-nucleinate (see *Ostauxin*), a yellowish powder, insoluble in water. Used in diarrhoea and dysentery. Dose: 20 to 40 grains.

Paracodin. — Dihydro-codeine. Dose: $\frac{1}{8}$ to $\frac{1}{2}$ grain in cough.

Paraform, sometimes called *Triformol*, bears the same relation to formaldehyde that paraldehyde does to aldehyde. By heating it gives off formaldehyde. It is a white, crystalline powder, with antiseptic and astringent properties, and is given in doses of 8 grains or more in choleraic diarrhoea. It is also used as a surgical antiseptic.

Para-plejapyrin. — A combination of equal molecules of paratoluolsulphamide and dimethylphenylpyrazolone. An antipyretic and anti-headache remedy in 15-grain doses.

Pararegulin. — See *Regulin*.

Paratoxin. — A petroleum-ether extract of bile, given hypodermically in tuberculosis for increasing the patient's resistance to the bacillus.

Paraxin. — The trade-name for dimethyl-aminoparaxanthine, a white, crystalline substance sparingly soluble in cold water. Dose (as a diuretic): 5 to 10 grains.

Pegnin. — A rennet compound used to prepare milk for infants and invalids.

Pelletierine (Punicine). — A mixture of pelletierine and iso-pelletierine. The salts which are used medicinally are: *Hydrobromide*, a brown, thickish fluid, soluble in water and alcohol, dose 2 grains; *sulphate*, similar in appearance and properties to the former, dose (for tapeworm) 6 grains with 8 grains of tannin; *tannate*, a greyish-brown, hygroscopic, an tasteless powder, dose 5 grains in

an ounce of water, followed in half an hour by a dose of castor oil or senna.

Pellidol.—Diacetyl amido-azotoluol. Resembles azodermin in appearance, properties, and uses (promoting skin-growth). *Azodolen* is a combination of *iodolen* (iodol-albumin) and pellidol for the same purpose.

Pellotine, the alkaloid of *Anhalonium Williamsii*, which has hypnotic properties. The hydrochloride is in white crystals, soluble in water. Dose: 1 grain.

Pergenol.—So-called 'solid hydrogen peroxide,' being a mixture of sodium perborate and sodium bitartrate in molecular proportions. Used as an antiseptic.

Perhydrol.—Merck's peroxide of hydrogen (30 per cent. by weight = 100 vol. H_2O_2); magnesium and zinc perhydrol are the peroxides of these bases.

Peristaltin.—The name given to a water-soluble glucoside, $C_{14}H_{18}O_8$, obtained from *cascara sagrada*, recommended as a laxative for administration by subcutaneous injection.

Peronine.—The trade-name for hydrochloride of benzoyl morphine, a white powder soluble in water and dilute alcohol. A sedative in asthma and bronchial affections. Dose: $\frac{1}{4}$ to 1 grain (maximum 3 grains).

Pertussin.—A proprietary preparation of German thyme, recommended for whooping-cough. A homœopathic medicine is similarly named.

Peruol.—A 25-per-cent. solution

in castor oil of peruscabin (synthetic benzoic acid benzyl ester, a constituent of Peru balsam). Used as a remedy for itch.

Phenamin.—Another name for Phenocoll (*q.v.*).

Phenegol.—A nitro derivative of paraphenol sulphonate in combination with mercury (33 per cent.) and calcium. A brown powder, soluble in water. Is described as an 'egole,' and has powerful bactericidal properties.

Phenocoll Hydrochloride.—The hydrochloride of the amido-acetic derivative of paraphenetidin (*i.e.*, phenacetin *plus* an amido group). A colourless, crystalline powder, soluble 1 in 16 of water. Dose: 5 to 15 grains in acute rheumatism.

Phenoltetrachlorophthalein.—Recommended to be given subcutaneously as a laxative, especially for the insane. May also be given by the mouth in the same doses as phenolphthalein.

Phenosal.—Paraphenetidin acetyl-salicylate, a colourless, crystalline compound, sparingly soluble in water. Dose: $7\frac{1}{2}$ grains.

Phenostal.—Tablets containing diphenyl-oxalic ester, which dissociates into carbolic and oxalic acids when treated with water. Used to make antiseptic and disinfecting solutions.

Phenyform.—A grey powder consisting of phenol and formaldehyde, used as an antiseptic dusting-powder for wounds.

Phesin.—Sodium phenacetin sulphonate, a reddish powder, soluble in water. Dose: $7\frac{1}{2}$ grains.

Phosote.—The trade-name of creosote phosphate, a colourless, syrupy fluid, containing 80 per cent. of creosote and having similar therapeutic properties.

Physostol.—A proprietary 1-per-cent. solution of physostigmine in olive oil.

Phytin is the trade-name of anhydroxymethylenediphosphate of calcium and magnesium (a constituent of green plants), which acts therapeutically as phosphorus rather than as a phosphate. Dose: 8 grains.

Piperazine (diethylenediamine) occurs in colourless crystals, soluble in water. A uric-acid solvent used in gout, or to prevent it. Dose: 2 to 10 grains in aerated water.

Piperidine.—The bitartrate of the synthetic base (hexahydropyridine) is used like piperazine. Occurs in colourless crystals, soluble in water. Dose: 10 to 15 grains.

Piperine, the alkaloid of black pepper, has been used as an antipyretic and stomachic in malaria and dyspepsia. Is in yellow prisms, soluble in alcohol. Dose: antipyretic, 4 to 8 grains; stomachic, 1 grain.

Piscarol is the name of a thickish, tar-like fluid, insoluble in water, which is stated to possess the therapeutic properties of ichthyol.

Pittysten is said to be identical with Eupecin (*q.v.*).

Pleistopon. — Narcotine - free Pantopon (*q.v.*).

Plejapyrin.—A crystalline compound of benzamide and phenazone; a white, water-soluble powder. Dose: 15 grains.

Pneumin.—The trade-name of methylene creosote, put up in $\frac{1}{2}$ -grain tablets as a tuberculosis-specific.

Pollantin.—A serum, supplied as liquid or powder, for use against hay fever. Known also as *Graminol*. *Pollantin R.* is the dilution with milk sugar for snuffing.

Polyformin occurs in soluble and insoluble forms, and is a combination of resorcin (2 mol.) and hexamethylene-tetramine (1 mol.), so that it yields formaldehyde on heating. Recommended for skin-diseases, the insoluble kind as a substitute for iodoform.

Proiodin, or **Lactoid**, is obtained by the action of iodine on casein, and contains about 8 per cent. of iodine. A yellowish-white powder, insoluble in water. Dose: 15 grains.

Propal is a name for dipropyl-barbituric acid, and *Propol* is a vasogen of *Propolisin*, a product from the destructive distillation of beeswax.

Propäsin. — Para-amidobenzoic propylester, a local anæsthetic. In white crystals, but marketed in pastilles, ointment, suppositories, bougies, &c. *Dipropäsin* is a condensation-product of it, said to ease intestinal pain when given in 8 to 15 grain doses.

Propionyl Salicylate has been proposed as an antirheumatic.

Proponal.—A relative of veronal, being dipropyl-barbituric acid. Insoluble in water, but soluble in alkalies; it thus dissolves in the

intestine only. Dose, in cachets: 3 to 5 grains as a hypnotic.

Propylamine.—An alkaline liquid [$\text{CH}_3(\text{CH}_2)_2\text{NH}_2$] the salts of which are useful in chorea and hysteria. Dose: 10 to 20 grains thrice daily. The name is also erroneously given to a 10-per-cent. solution of trimethylamine, which, like true propylamine, is a colourless fluid of ammoniacal odour. Soluble in water. Anodyne and sedative in chorea, rheumatism, and pneumonia. Dose: 20 to 60 minims.

Protargol.—A proteid compound of silver. It is a yellow powder, containing 8.3 per cent. of silver, and is soluble in water. A $\frac{1}{4}$ to 2 per cent. solution is used as an antiseptic injection in gonorrhœa, and a 10 to 20 per cent. solution by oculists in place of silver nitrate.

Ptyalin.—An amylolytic ferment. A yellowish powder, soluble in water and glycerin. Dose: 5 grains or more.

Purgatin, or purgatol, is diacetyl-anthrapurpurin, a yellow, crystalline powder, insoluble in water and dilute acids, but dissolving in dilute alkali, forming a violet-red solution. Is an aperient of the cascara-sagrada type. Dose: $7\frac{1}{2}$ to 15 grains or more.

Purgen.—A trade-name for a phenolphthalein preparation.

Pyocyanase.—A preparation of an enzyme obtained from *Bacillus pyocyaneus* with nuclease. Used to spray the throat to dissolve the membrane in diphtheria.

Pyoktanin.—A trade-name for two aniline dyes related to methyl

violet, and used in surgery on the supposition that they stain and kill microbes. Yellow pyoktanin is used for eye-diseases (0.5-per-cent. solution) and in syphilis, the blue for surgical cases (1 to 2 per cent. solution, ointment, and dusting-powder). There is also a mercurial compound used as a gonorrhœal antiseptic (1 to 100 of water).

Pyonin.—A form of finely divided sulphur.

Pyramidon is dimethyl-amido-antipyrin. Almost white crystals, soluble in water (1 in 10). Antipyretic. Dose: 5 grains or more. The *neutral camphorate* and *acid camphorate* are given in the same doses, and the *salicylate* is especially recommended for phthisis and in mild fevers. Dose: 10 to 15 grains.

Pyrantin is a succinic derivative of phenetidid (para-ethoxyphenyl-succinimide). *Pyrantin soluble*, the sodium salt, is employed. Dose: 5 to 10 grains.

Pyridine.—Used for inhalation in asthma. It is a colourless fluid, soluble in water and alcohol. A fluid drachm of it is poured upon a plate and inhaled. For diphtheria 10-per-cent. solution is brushed on the membrane. Internally, 5 to 10 drops in water is the dose. *Pyrodin* is acetyl phenylhydrazine, an antipyretic and antirheumatic remedy in 5 to 10 grain doses, also used externally as a 1-in-10 ointment for psoriasis.

Pyrilin.—The trade-name for a preparation of pyridin ethylphosphinate, which should not be con-

founded with *Pyrolin*, a magnesium-acetate disinfecting preparation.

Pyrosal.—See *Acetopyrin*.

Pyrozone.—A 50-per-cent. solution of hydrogen peroxide in ether.

Quietol.—Valeryl-oxy-butyreine hydrobromide. A crystalline powder, easily soluble in water and alcohol, which acts like a mixture of a bromide and chloral hydrate as a nerve tonic and antineuralgic. Dose : 8 to 15 grains.

Quinine Acetyl-salicylate.—A white, crystalline powder, used as an antipyretic. Dose : 2 to 6 grains.

Quinine Nucleinate.—A yellowish powder, sparingly soluble in water, employed subcutaneously for syphilis in olive-oil solution (1 in 20). Dose : 1 to 5 grains.

Regulin.—An agar-agar jelly containing 25 per cent. of cascara sagrada extract. *Pararegulin* is a preparation of liquid paraffin and cascara sagrada extract, in capsules.

Renaglandin.—The trade-name for a preparation of the suprarenal gland, each fluid drachm of which equals 5 grains of the fresh gland.

Resaldol is a resorcin derivative, $C_{26}H_{14}O_5 \cdot (CH_3CO)_2$. An amorphous, light-brown powder, insoluble in water. A gastric and intestinal antiseptic. Dose : 15 grains.

Resorbin.—The trade-name of an ointment-base said to contain almond oil 5, soap 2, white wax 3, lanoline 6, gelatin 1, and water 3. A mercurial resorbin is also on the market (Hg = 33 or 50 per cent.). *Resorbol* is a combination of higher fatty acids with iodine (10 per cent.) which does not stain the skin.

Resorcinol is made by melting together equal parts of iodoform and resorcin. A brown, crystalline powder. Used in skin-diseases; dusting-powder 1 to 4 of starch, and ointment 20 to 40 grains per ounce.

Retinol, or resin oil, is obtained by the distillation of Burgundy pitch or resin. It is a solvent for phosphorus, camphor, phenol, salol, aristol, and iodol. *Resinol* is a proprietary ointment employed in skin-diseases.

Rheumatin is salicyl-quinine salicylate, which crystallises in needles that are sparingly soluble in water. Used in acute rheumatism. Dose : 15 grains.

Rubidium Salts resemble therapeutically those of the allied metals potassium and sodium, but have advantages, according to some investigators, which have not yet been demonstrated clinically. The salts used are : *Bromide*, colourless, soluble in water, dose 5 to 10 grains; *iodide*, the same, dose 1 to 6 grains; *tartrate*, the same, dose 3 to 5 grains; *ammonio-bromide*, the same, dose (antiepileptic) 15 grains, (hypnotic) 60 grains.

Sabromin.—A trade-name for calcium dibromo-behenate, a white powder, insoluble in water, which is employed as a substitute for alkaline bromides in doses of 15 to 45 grains.

Sajodin.—Calcium mono-iodo-behenate, $Ca(C_{22}H_{42}O_2I)_2$, a white, odourless and tasteless powder, insoluble in water. Properties like iodipin. Dose : 15 to 30 grains.

Salacetol (Salantol).—Acetol-salicylic ester. Is an antirheumatic remedy in crystalline powder, insoluble in water. Dose: 10 to 30 grains.

Salactol.—A solution of sodium lactate and salicylate in 1 per cent. hydrogen peroxide. Used to paint the throat in diphtheria.

Salamide.—A pinkish, crystalline substance, obtained by the action of ammonia on methyl salicylate. Soluble in alcohol and ether, and used like the salicylates in similar doses.

Salen.—A mixture of methyl- and ethyl-glycol salicylates. An oily, odourless liquid, used as an antirheumatic. *Salenal* is a 1-in-3 ointment of the same.

Salibromin. — Dibromsalicylic methyl ester, a white powder, soluble in alkalis, and used as an antirheumatic and antipyretic. Dose: 10 to 15 grains.

Salicylamide—



Colourless crystals, slightly soluble in water. Dose: 2 to 4 grains.

Salifebrin, or acetanilide salicylate, is an antipyretic and antineuralgic in doses of 5 to 10 grains.

Saliformin.—See *Formin*.

Saligallol.—Trade-name for a 33-per-cent. solution (in acetone) of pyrogallol disalicylate. Used (diluted with acetone) as a varnish in skin-diseases.

Saligenin, sometimes called *dialthesin*, is obtained by the hydrolysis of salicin, or by combining phenol and formaldehyde. Colourless crystals, almost insoluble in water,

but soluble in alcohol. Dose: 7 to 15 grains in cases of acute rheumatism.

Salimenthol.—Menthol salicylic ester, a yellowish liquid; sedative and antiseptic. Dose: 4 grains, in capsules. *Samol* is an ointment containing 25 per cent.

Salipyrin, or antipyrin salicylate.—A colourless and odourless powder, insoluble in water, of a sweetish taste, formed by the interaction of antipyrin and salicylic acid. Possesses the medicinal properties of its constituents. Dose: 5 to 15 grains, in powder or tablets.

Salitannol.—A compound of equal molecular proportions of salicylic and tannic acids. Is a white, amorphous powder, insoluble in water, used as a substitute for iodoform.

Salite, the salicylic ester of borneol, is an oily liquid, insoluble in water. Dose: ʒss. in rheumatism, or rub with a solution of 1 part in 2 of olive oil.

Salocoll, or phenocoll salicylate. A white, crystalline powder, soluble in water. Antirheumatic and antipyretic. Dose: 5 to 15 grains. *Salicol* is a French cosmetic solution of salicylic acid and wintergreen oil in weak alcohol.

Salol Camphor is a mixture of salol 3 parts and camphor 2 parts, rubbed together until liquefied.

Salophen, or acetyl-para-amido-salol, occurs in white scales, insoluble in water. For rheumatism and neuralgia. Dose: 15 grains.

Saloquinine, or salicyl-quinine (*chinin* in German), is the base of

rheumatin. Insoluble in water. An antipyretic in typhus, &c. Dose: 5 to 10 grains.

Salossit.—A compound of calcium, magnesium, and phosphorus with organic substances and milk sugar (95 per cent.), given in rickets as a substitute for cod-liver oil.

Salubrol is an antipyrin derivative ($C_{23}H_{21}N_4O_2Br_4$), an orange-yellow powder used instead of iodoform. Insoluble in water, soluble in alcohol.

Salvarsan ('606'). — Dioxidiaminoarsenobenzol dihydrochloride, $C_{12}H_6As_2(OH)_2(NH_2)_2(HCl)_2$. An antisyphilitic claimed to exert a specific action on the spirochetæ. Put on the market in sealed tubes, each containing 0.6 gramme, which is the dose for injection, intramuscular or intravenous. Full directions are given with each tube for preparing the injection—substantially by mixing the substance with water and a sufficiency of sodium-hydrate solution to neutralise. According to Dr. W. H. Martindale (*C. & D.*, lxxvii. 897), these are not strictly accurate. The following description by him of the preparation of the injection shows what takes place (0.3 gramme was used in this case):—

The salvarsan was placed in a small glass mortar and rubbed with 5 c.c. of water, in which quantity it is easily soluble; decinormal sodium-hydrate solution was then added from a burette; a precipitate formed, which redissolved until 5.8 c.c. had been added. The mixture became

gelatinous when 6.4 c.c. had been added, and looked somewhat like melted yellow petroleum-jelly, becoming thinner again on further addition of alkali (6.8 c.c. according to theory is required to produce the *mono-hydrochloride*). Adding the alkali further, it was found that 12 c.c. approximately in all was requisite to neutralise, litmus-paper being used, which indicates the formation of the *base* (theory demands 13.7 c.c.). Adding alkali further, the precipitate visibly diminished, an almost clear solution being formed when 18 c.c. in all had been added (theory demands 20.5 c.c. for the formation of the *mono-sodium compound*—the third stage in the matter). The addition of a further quantity of alkali (up to 27.4 c.c.—the amount theoretically necessary for the *di-sodium compound*) did not render the solution absolutely clear, but filtration would effectually remove the slight opalescence.

For intravenous use a more dilute solution is advised by the makers—viz., 0.5 gramme is to be treated with 0.95 c.c. of 15 per cent. by weight of sodium-hydrate solution, the liquid being finally diluted to about 200 c.c.

Sanguinarine, the alkaloid of blood-root, should be distinguished from the resinoid *sanguinarin*. Dose of the alkaloid or its salts (nitrate and sulphate): $\frac{1}{20}$ to $\frac{1}{10}$ grain.

Sanoform. — Methyl diiodosalicylate, a white, inodorous powder obtained by acting upon methyl salicylate with iodine. Used in place of iodoform.

Santalol.—A pale yellow liquid, obtained from sandalwood oil, of

which it forms 90 per cent. Dose : 5 to 30 minims.

Santoninoxim is a derivative of santonin, and, like it, used as a vermifuge. In colourless crystals, soluble in water. Dose : Two to three years, $\frac{3}{4}$ grain, and so on up to 5 grains for children of fourteen years.

Santyl.—The salicylic ester of santalol. Recommended as a tasteless substitute for santal oil. Dose : 30 minims, in capsules.

Scopolamine is hyoscine.

Secretin.—A preparation obtained from the mucous membrane of the duodenum of the pig. Used for diabetes.

Sicco.—A hæmoglobin preparation, in powder, given in anæmia. Dose : 15 to 30 grains.

Sidonal is piperazine quinate, Used as a solvent of uric acid. *New Sidonal* is quinic anhydride, and is also used for gout. Dose of either : 5 to 15 grains.

Silin.—The trade-name for hexamethylenetetramine - citro - silicate, used in the form of an aerated water (24 grains in 20 oz.) as a urate solvent.

Silver-Atoxyl.—Silver aminophenylarsonate (Ag 33 per cent. and As 23 per cent.). Administered as a 10-per-cent. olive-oil emulsion hypodermically in blood-poisoning.

Soamin.—The trade-name for sodium para-aminophenylarsonate. A white powder soluble in about 5 parts of water, and containing 22·8 per cent. of arsenium. Given intramuscularly in trypanosomiasis, malaria, and syphilis. Doses : Oral,

$\frac{1}{4}$ to 1 grain ; intramuscularly, 1 to 5 grains.

Sodium Cacodylate.—See *Acid, Cacodylic*.

Sodium Coumarate.—Used in 22-per-cent. aqueous solution, hypodermically, for phthisis. Dose : 25 minims.

Sodium Formate.—See *Acid, Formic*.

Sodium Mercurio-nucleinate.—This compound contains 10·21 per cent. of mercury in non-ionisable form, soluble in water. Used in the treatment of secondary syphilis. Dose : 0·5 to 1·0 c.c. of a 10-per-cent. solution injected intramuscularly.

Sodium Paracreosotate.—Similar in physical appearance, therapeutical action, and dose to sodium salicylate. Is preferred to salicylate in infantile diarrhœa.

Sodium Peroxide (Na_2O_2).—Parts with its oxygen in presence of water, and is used as a means of obtaining oxygen, also as a bleaching agent.

Sodium Sulphobenzoate.—(1) The name given to a crystalline product made by dissolving molecular proportions of sulphocarbolate and formate of sodium in water and crystallising. Used as a urinary antiseptic. Dose : 15 to 30 grains. (2) White crystals of

$\text{C}_6\text{H}_4\text{.OH.COOH.SO}_3\text{Na}$
—an antiseptic, used in aqueous solutions up to 5-per-cent. strength.

Sodophthalyl.—Di - sodium-quinone-phenolphthalein. A non-irritant laxative that can be administered *per os* or in subcutaneous

injections in smaller doses than phenolphthalein.

Solanine possesses analgesic and sedative properties, especially in asthma and painful gastric troubles. Dose : $\frac{1}{8}$ to $\frac{1}{2}$ grain.

Solurool.—Thyminic acid, a nuclein derivative which is obtained from yeast. Used as a uric-acid solvent. Dose : 4 to 8 grains in tablets.

Solveol.—A name given to a surgical antiseptic solution of cresol in sodium-cresotinate solution.

Somnoform.—An anæsthetic mixture of ethyl chloride (60), methyl chloride (35), and ethyl bromide (5). Supplied in tubes and capsules.

Sophol.—A yellowish-white powder, soluble in water, and combining formaldehyde, nuclein, and silver. Used in blenorrhœa of infants (5-per-cent. solution).

Sozal, or aluminium paraphenol-sulphonate.—A brown, crystalline powder, soluble in water, glycerin, and alcohol. It is an antiseptic (1-per-cent. solution used).

Soziodol (Diiodoparaphenol Sulphonic Acid).—The sodium salt is most familiar, and is frequently referred to as soziodol. Mercury, lithium, potassium, and zinc salts are also to be had. All are crystalline solids. Soziodol is an iodoform-substitute, used as an ointment, 20 to 40 grains to the ounce, in 5 to 10 per cent. dusting-powders and 1 to 2 per cent. solutions. The mercury salt is given internally. Dose : $\frac{1}{2}$ grain.

Sparteine.—The alkaloidal active principle of broom, the sulphate of which is the most commonly

used salt. It occurs in white crystals easily soluble in water. Medicinally it is a heart-tonic and diuretic. Dose : $\frac{1}{4}$ to $\frac{1}{2}$ grain. In erysipelas a solution (2 grains to the ounce) is applied.

Spirosal.—The trade-name of salicylic mono-glycolester. An oily fluid, soluble in alcohol, ether, and 1 in 8 of olive oil. Applied externally in rheumatism, half a drachm being used daily.

Stoman.—The name for a proprietary preparation of formaldehyde and maltose in 1-gramme tablets. Used as a mouth and throat antiseptic.

Stovaine.—The white, crystalline hydrochloride of ethyldimethyl-amino-propanol benzoic ester. A local anæsthetic half as toxic as cocaine, used for spinal anæsthesia and generally in surgery. Dose : $\frac{1}{6}$ to $\frac{1}{2}$ grain.

Strontium Bromide.—Occurs as colourless crystals, soluble in water. Antiepileptic. Dose : 5 to 30 grains. Other strontium salts used medicinally are : *Carbonate* (5 to 30 grains), *cinnamate* (2 to 5 grains), *glycerophosphate* (3 to 8 grains), *iodide* (5 to 20 grains), *lactate* (5 to 10 grains), *phosphate* (8 to 30 grains), and *salicylate* (10 to 30 grains).

Styptol and **Stypticin**.—See *Cotarnine*.

Styracol is guaiacol cinnamate. Colourless crystals, soluble in alcohol. Dose : 15 grains several times daily in gonorrhœa and as an intestinal antiseptic.

Subcutin.—Trade-name of sulphophenate of Anæsthesin (*q.v.*).

Subeston.—A basic aluminium di-acetate, $\text{Al}_2(\text{C}_2\text{H}_3\text{O}_2)_2(\text{OH})_4$; a white powder used as an astringent and antiseptic dressing for wounds.

Sublamin is mercuric ethylene-diamine-sulphate, a colourless, crystalline powder; soluble in water and sparingly in alcohol. Put up in 1-gramme tablets with directions to dissolve each in a litre of water.

Substitol.—The trade-name for dried fibrin from horses' blood. Used as a dusting-powder or paste for wounds.

Sucramin is the ammonia salt of saccharin.

Sulfidal.—A trade-name for colloidal sulphur. See *Sulphoid*.

Sullacetin.—A white powder, soluble in water, which is a combination of Guaiacetin (*q.v.*) and potassium guaiacol-sulphonate. Dose: 8 grains for tuberculous affections.

Sulphaminol, or thio-oxy-di-phenylamine, is a greenish-yellow, antiseptic powder, insoluble in water, but soluble in alcohol. Externally replaces iodoform; employed internally for cystitis, dose 5 grains, which is also the dose of the salicylate in rheumatism and cystitis.

Sulphoid.—A trade-name for the colloidal form of sulphur in greyish-white powder, insoluble in alcohol, ether, and acetone, but soluble in water and normal saline solution. Contains 80 per cent. of sulphur and 20 per cent. of albumen. Lotions

are made with 20 grains to the ounce.

Suprarenin.—A trade-name for adrenalin, B.P.

Symphorol, also known as 'nasrol,' is a name given to the caffeine sulphonates of the alkali and alkaline earth-metals, in particular the sodium, lithium, and strontium salts. Diuretics in kidney and heart complaints. Dose: 10 to 15 grains.

Syrgol.—A combination of oxidised colloidal silver and albumoses ($\text{Ag} = 20$ per cent.) in brownish-black scales, soluble in water and glycerin. Used as an injection ($\frac{1}{4}$ to $\frac{1}{2}$ grain per oz.) in the treatment of gonorrhœa.

Tachiol is the trade-name for silver fluoride, which in 1-in-1,000 solution is used as an antiseptic.

Taka-diastase.—A form of diastase prepared by a symbiotic process from rice, and presented in the form of a brown powder. Dose: 1 to 5 grains.

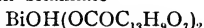
Tanargentan.—A tannin-silver-albumin preparation ($\text{Ag} = 10$ per cent.). Is soluble in water with difficulty, yielding a brownish-black solution. Dose: $7\frac{1}{2}$ grains in diarrhœa, dysentery, and typhoid. *Tanargentan pro infantibus* is the same preparation, but containing only 1.5 per cent. of silver and 25 per cent. of tannin. Dose: 4 to 8 grains.

Tannalbin, or tannin albuminate, is a light-brown powder containing 50 per cent. of tannin, which is liberated in the intestines; hence is recommended as an astringent in diarrhœa, especially of children. Dose: 5 to 15 grains.

Tannaphthol.—A condensation-product of benzonaphthol and tannin albuminate. Used as an intestinal astringent and antiseptic. Dose : 8 to 16 grains.

Tannigen (diacetyl tannin).—A yellowish-grey, odourless, and tasteless powder, recommended as a remedy in diarrhoea. Dose : 2 to 8 grains, with $\frac{1}{5}$ grain of calomel.

Tannismut.—A trade-name for bismuth bitannate—



—a yellow powder, given in chronic dysentery in doses of 5 to 10 grains every four hours.

Tannisol.—Methylene bitannin, a condensation-product of tannin and formaldehyde. A red, tasteless powder, for intestinal catarrh and as an antiseptic dusting-powder. Doses : For children, 1 to 4 grains ; for adults, 8 grains.

Tannoform.—A red powder, which is a condensation-product of gallotannic acid and formaldehyde, and is used, *per se* or diluted with starch, as a dusting-powder in hyperidrosis, bromidrosis, and similar troubles, to dry the secretion and reduce the foul odour. Dose : 4 to 15 grains.

Tannone, or **Tannopine**, is hexamethylene-tetramine tannate, a brown, hygroscopic powder, given as an intestinal astringent and antiseptic in doses of 15 grains.

Tannophen.—An antiseptic powder consisting of chlorometacresol and formaldehyde, used as a substitute for iodoform.

Tannyl.—The trade-name of oxychloro-casein tannate. A greyish-

brown insoluble powder, recommended as an intestinal astringent. Dose : 15 to 45 grains.

Tanocol is a combination of tannin and gelatin. A water-insoluble powder. Dose : 15 grains or more ; for infants, 5 grains or more.

Tenaline, or **Tenalgine.**—A mixture of alkaloids of areca-nut (arecaine, arecaine and guvacine). Dose : 1 grain.

Terpin Hydrate.—A colourless, crystalline solid, slightly soluble in water, and soluble in alcohol. Used in bronchitis and other chest-affections. Dose : 3 to 10 grains, in cachet, lozenge, pill, or mixture.

Terpinol is a colourless, oily liquid, obtained by boiling terpin hydrate with dilute mineral acid. It is insoluble in water, but soluble in alcohol and ether. Its uses are the same as those of terpin hydrate. Dose : 3 drops, in milk or gelatin capsules.

Tetronal.—An analogue of sulphonal (it is diethylsulphon-diethylmethane), occurring in white crystals, scarcely soluble in water, fairly so in alcohol. Dose as a hypnotic : 15 grains.

Thallin is tetrahydroparaquin-anisol. The sulphate is a crystalline solid, soluble in water and less soluble in alcohol. Dose : 3 to 8 grains in pill. For gonorrhoea, as an injection, 4 to 8 grains in 1 ounce of water, or as bougies with cocoa-butter. Also used : *Hydrochloride*, *periodide*, and *tartrate*, each in doses of 3 grains upwards.

Theocin.—See *Theophylline*.

Theolactine.—A double salt of theobromine sodium and sodium lactate, in fine white powder, soluble in water. Dose (as a diuretic): 15 grains.

Theophorin.—Theobromine-sodium formate, analogous to diuretin. A white powder, soluble in water, used as a cardiac tonic and diuretic. Dose: 10 to 15 grains.

Theophylline.—An alkaloid occurring in tea. Is produced synthetically and marketed as *theocin*. It occurs in white, crystalline needles, sparingly soluble in water. Has diuretic properties. Dose: 3 to 6 grains. The compound, *theocin-sodium acetate*, is preferred in England for reducing dropsy. Dose: 3 to 8 grains in cachet with digitalis.

Thermodin is phenacetin-urethane, a crystalline substance, possessing analgesic and antipyretic properties in typhoid, pneumonia, influenza, and the like. Dose: As an antipyretic, 5 grains; as an analgesic, 15 grains—as powders, being insoluble in water.

Thiarsol.—A special make of colloidal arsenium trisulphide for trypanosomiasis.

Thilaven.—A solution of linalyl acetate-thiozonide and alkali-thiozonate. Used for the preparation of sulphur-baths free from unpleasant odour.

Thimothein.—A para-tuberculin precipitated by alcohol from cultures of *Bacillus Timotheus*. For the tuberculosis ophthalmo-reaction.

Thiocol is potassium-guaiacol sulphonate, one of the best forms

for administering guaiacol, as it is a white powder freely soluble in water. Dose: 6 grains, gradually increased to 60 grains per day. *Thiocolin* is a syrup of thiocol and bismuth loretinate.

Thiodin, or Tiodine.—A compound of ethyl iodide and thiosinamine for use in lupus, tabes, and nervous diseases, acting as a diuretic and appetiser. Dose: $1\frac{1}{2}$ grain in pill twice a day, or hypodermically 15 minims of a 10-per-cent. solution.

Thioform is basic bismuth di-thiosalicylate. A substitute for iodoform; in brownish-yellow powder, odourless, and insoluble in water and alcohol. Dose: 5 grains.

Thiol, a tarry product, introduced as a substitute for ichthyol. It is a dark-brown syrupy liquid, soluble in water. Also in powder. Aluminium, bismuth, iron, mercury, silver, and zinc compounds of it are also obtainable. *Thiolan* (sulpholan) is a sulphur ointment with lanoline basis. *Thiolin* (1) a syrup of potassium sulpho-guaiacolate (6.5 per cent.), or (2) potassium and sodium salts of thiolinic acid, (i.e., sulphonated linseed oil).

Thiosinamine, or allyl-sulpho-urea, occurs in colourless prisms, soluble in water and alcohol, and has a faint garlic odour and bitter taste. Introduced by Hebra as a subcutaneous injection in lupus and tuberculosis, in doses of from 4 to 8 grains in dilute alcohol. See also *Fibrolysin*.

Thiozon.—(1) A preparation of thiozonide of linalyl acetate and

sodium sulphide, for the treatment of scabies. (2) A compound of sulphur analogous to ozone.

Thymol Carbonate (*syn.* thymotal and thymol-urethane) occurs in tasteless and colourless crystals. A vermifuge. Dose: Adults, 30 grains; children, 5 to 15 grains daily, missing the fifth day, when a dose of laxative medicine should be taken.

Thyresol. — Santalol - methyl-ester. A colourless fluid with cedar-wood odour and slightly aromatic taste. Soluble in alcohol, ether, chloroform, and oils. For venereal diseases. Dose: mviij . The tablets are made with magnesium carbonate.

Thyroglandin.—A preparation representing all the active principles of the thyroid. A greyish powder, of which $8\frac{1}{2}$ grains is equal to one gland. Dose: 4 grains.

Toluene, or toluol, one of the constituents of commercial benzene, is used in the pure state as Loeffler's solution—a topical application for diphtheria.

Tolysal, or tolypyrin salicylate— $\text{C}_{12}\text{H}_{14}\text{N}_2\text{O} \cdot \text{C}_7\text{H}_5\text{O}_3$ —is an amorphous, white powder, insoluble in water. Antirheumatic and analgesic. Dose: 15 grains. (*Tolypyrin* is tolyldimethylpyrazolon, and is given in the same doses.)

Tribromo-beta-Naphthol. — A brownish crystalline mass, tasteless and odourless, readily soluble in alcohol, acetone, benzol, and oils. Recommended as an antiseptic, and used as a dusting-powder or as an ointment.

Tribromophenol (or bromol) is used as an antiseptic. It is a solid, in very soft, white crystals, scarcely soluble in water, but soluble in alcohol. Dose: 1 to 2 grains.

Trichlorophenol. — A white, crystalline substance, with antiseptic properties; soluble in alcohol, ether, glycerin, and fixed oils. Used as an ointment, 1 in 10.

Triferrin is substantially iron paranucleinate, a reddish-brown powder for anæmia. Dose: 5 grains.

Trigemin.—A crystalline compound obtained by interaction of butyl-chloral hydrate and pyrimidon. Has an aromatic odour and a sweet taste, and is insoluble in water. An analgesic in migraine and neuralgia, and antipyretic in influenza. Dose: 5 to 15 grains.

Trimethylamine (propylamine). A colourless liquid with an odour and taste like herring-brine. Used in rheumatism and gout. Dose: 5 minims.

Trional is a hypnotic chemically identical with methyl sulphonol, B.P.

Triphenin, or propionylphenetidin, is a phenacetin-substitute in white crystals. Dose: As an antipyretic, 5 to 10 grains; as an analgesic in neuralgia, 15 grains.

Tropacocaine Hydrochloride. In colourless needles. A 3 to 5 per cent. solution (normal saline) is used as a local anæsthetic.

Tryparosan.—A halogen derivative of para-fuchsine, proposed by

Ehrlich for use in sleeping-sickness as an adjuvant to arseno-phenylglycin.

Trypsin.—The pure ferment from the pancreas. Is employed in the treatment of pancreatic dyspepsia, diabètes, &c.

Tussol.—The trade-name for antipyrin amygdalate. Dose (for children): 1 grain daily for each year up to 15—*i.e.*, a third of that for each dose.

Tylcalsin, tyllithin, and tylnatrin are trade-mark names for calcium, lithium, and sodium acetyl-salicylates. Dose of each: 5 to 15 grains.

Tylmarin.—Acetyl-coumaric acid. Colourless crystals, used in treatment of phthisis. Dose: 5 to 10 grains.

Tyramine.—The trade-name of para-hydroxyphenylethylamine—an important active principle of aqueous extracts of ergot. Hypodermic dose: $\frac{1}{25}$ grain.

Ulexine.—A crystalline alkaloid obtained from *Ulex europæus*. Used as a diuretic. Dose: $\frac{1}{20}$ to $\frac{1}{15}$ grain.

Uranium Nitrate.—Pale yellow crystals, soluble in water. Employed in diabetes. Dose: 1 to 2 grains. Externally as a hæmodynamic and in gonorrhœa, 2 grains to the ounce.

Urea, or Carbamide.—Synthetic urea is used as a diuretic. Occurs in crystals soluble in their own weight of water. Dose: 10 to 60 grains.

Ureabromin.—Calcium bromide and urea $[\text{CaBr}_2 \cdot 4\text{CO}(\text{NH}_2)_2 = \text{Br } 36 \text{ per cent.}]$, in colourless and

odourless crystals, slightly hygroscopic, and soluble in water and in alcohol.

Ureol.—Hexamethylene-tetramine in combination with lithium and sodium benzoates, used as a diuretic and urinary antiseptic. Dose: A teaspoonful.

Urethane (Ethyl Carbamide) is a white, crystalline solid, soluble in water and alcohol. Employed as a hypnotic in doses of 15 to 30 grains.

Uritone.—A trade-name for hexamethylene-tetramine.

Uroclital.—Theobromine-sodium citrate, analogous to diuretin, used as a diuretic. Dose: 8 to 15 grains.

Urol.—Urea quinate, a uric-acid solvent. Dose: 3 to 8 grains.

Uropherin.—There are two varieties of this—*β-uropherin*, which is theobromine and lithium benzoate, dose 5 to 15 grains as a diuretic; *S-uropherin*, which is theobromine and lithium salicylate, dose and use as *β-uropherin*. Note that *urophoren* is the name of a peculiar bougie used in gonorrhœa.

Urosin.—The name applied to a compound tablet, containing quinic acid 0.5 gramme, lithium citrate 0.15 gramme, and sugar 0.3 gramme, for uric-acid diathesis.

Urotropine.—The protected name under which hexamine, B.P., was first introduced as a urinary antiseptic. *New Urotropine* is urotropine methylene citrate.

Valerophen.—Phenolphthalein menthyl-valerianate, a laxative powder in doses similar to phenolphthalein.

Validol.—A thick, colourless liquid, consisting of menthol valerianic ester, with 30 per cent. of free menthol. Dose: 10 to 20 drops on sugar as an antispasmodic in hysteria, nervous affections, and dyspepsia. Also in sea-sickness.

Valisan.—Bromisovalerianylborneol, an oily substance, soluble in organic solvents but not in water (Br = 25 per cent.). Sedative dose: 4 grains.

Valyl is valerianic diethylamide, an oily liquid, resembling valerian in medicinal properties. Dose: 2 grains, in capsule.

Vaso-constrictin.—A suprarenal-gland preparation.

Vasogen, or oxygenated petrolatum, is a vehicle for the application of medicinal agents to the skin. Various medicated vasogens, some liquid, some solid, are supplied—*e.g.*, creosote, ichthyol, iodine, menthol, and mercury—each with a suitable percentage of the medicament. The plain base is a solid.

Vasotonin.—A combination of yohimbine and urethane (1 c.c. = 0.01 gramme of yohimbine). Supplied in ampoules for hypodermic injection in the treatment of arteriosclerosis.

Velledol.—The trade-name for the active principle of the mistletoe (viscine), used in the treatment of menstrual disturbances and in arteriosclerosis. Dose: $\frac{3}{4}$ grain *per os*, hypodermically $\frac{1}{64}$ grain.

Veratrol [pyrocatechindimethyl ester, $C_6H_4(OCH_3)_2$] is obtainable in crystals, soluble in alcohol, ether,

and oils. Used as a paint with an equal part of tincture of iodine in intercostal neuralgia, and internally in tuberculosis. Dose: 2 drops, in capsule.

Veronal is the trade-name of diethyl-malonyl-urea—*i.e.*, barbitone, B.P.

Vesalvine S.—Hexamethylene-tetramine salicylate. Dose and uses like hexamine.

Vestosol.—A formaldehyde ointment, containing zinc oxide and boric acid.

Vioform, or **Nioform**, is iodo-chloro-oxychinoline, a yellow, odourless powder, used in the same way as iodoform or as an ointment (1 in 40).

Xaxa.—A trade-name for acetyl-salicylic acid.

Xeroform, or tribromophenol bismuth, is a yellowish-green powder, containing 50 per cent. of tribromophenol. It is an antiseptic, and as such is used as a substitute for iodoform. Also internally in 3 to 8 grain doses.

Yohimbine Hydrochloride is the salt of an alkaloid from the bark of *Corynanthe Yohimbé*, Schuhm. A powerful aphrodisiac. Soluble in hot water. Dispensed in aqueous solution 2 grains to the ounce. Dose: 20 drops.

Zymin.—A powder prepared by treating yeast with acetone. Used as a dusting-powder for wounds, and internally in 15-grain doses thrice daily. *Zymine* is a trade-marked name for a digestive preparation, and should not be confounded with this.

HOMŒOPATHIC DISPENSING.

WHATEVER views may be held as to the value of homœopathic treatment or the truth of the dictum *similia similibus curantur*, no one can dispute that homœopathic pharmacy is elegant. Indeed, the globules and pilules of Hahnemann in their dainty little tubes carefully excluded from the deleterious light-rays by neat outer cartons, were the forerunners of the tabloids and parvules, the granules and pellets, &c., with which we are so familiar to-day. And, if for this reason alone, the memory of the old German physician should be held in respect by modern pharmacists as the founder of elegant pharmacy, even if they deny his claims to be the first exponent of scientific therapeutics.

Until a few years ago homœopathic prescriptions were dispensed almost exclusively by homœopathic chemists, and if a stray one found its way to an ordinary chemist's, it was usually sent on to the nearest homœopathic chemist to be dispensed; the ordinary man either not caring to attempt to decipher the eccentric recipe or regarding it with contempt. Nowadays, doubtless due to increased competition, this procedure is seldom followed, many chemists not only dispensing homœopathic prescriptions—sometimes more and sometimes less correctly—but also advertising a special 'homœopathic department.'

Homœopathic prescriptions present few difficulties to a trained pharmacist, but they call for scrupulous delicacy and exactitude in dispensing, which are absolutely essential, and without which the dispenser is not rendering justice either to the patient or to his physician. The prescriptions may be

for tinctures, powders or triturations, pilules, globules, compressed tablets, and tablet-triturations.

Tinctures.—Prescriptions for tinctures usually consist of a single tincture, thus :—

Tinct. aconiti 3x ʒij.

Sig. : Gtt. ij. n. et m.

or of two tinctures to be taken in alternation, thus :—

Tinct. bryoniæ 3x ʒij.

Tinct. phosphori 3x ʒij.

Sig. : Gtt. iij. 2dis hor. alt. sumend.

If no quantity of water is specified, the drops should be directed to be taken in half a wineglassful. The bottles used should be of green or amber glass, and provided with a good lip or spout for dropping. Good corks are essential to dispensing of every kind, but for homœopathic work they are a *sine quâ non*.

The tinctures may be prescribed with the addition of water as mixtures, thus :—

Tinct. nucis vomicæ $\frac{12}{6}$

Aquæ destill. ʒvj.

M. Ft. mistura, cujus capiat cochlearia duo magna tertiis horis.

In this instance *twelve* drops of the *sixth* dilution are prescribed and water to 6 ounces.

Powders are much in favour with homœopathic doctors, and generally consist of so many grains of an ordinary sugar-of-milk trituration, thus :—

Trit. mercurii sol. 3x gr. iij.

Mitte tales chart. xij. Direct a powder to be taken dry on the tongue every four hours.

Or they may consist of a tincture dropped on to sugar of milk, dried, and weighed out, thus :—

Tinct. pulsat. 6 ʒvj.

Sacch. lactis q.s.

Ft. pulv. Direct this powder to be dissolved in six tablespoonfuls of water, and a tablespoonful to be taken every morning and evening.

In this case the 6 minims of the tincture is to be dropped on 18 grains of sacch. lactis, carefully incorporated by means of a bone spatula, allowed to dry, and then divided into 3-grain powders.

All homœopathic powders are wrapped in tinfoil in addition to the ordinary powder-paper.

Sometimes the powders are ordered to be prepared from globules or pilules. In this case the globules or pilules are simply crushed and triturated with the sacch. lactis :—

Glob. ignatiæ 6 iij.
Sacch. lactis q.s.


Ft. pulv. Mitte tales xij. Direct a powder to be taken every four hours.


Frequently the triturations are ordered in bulk, and if no quantity is specified a ʒij. bottle should be dispensed :—

Hepat. sulphuris 3ʒ ʒij.

Sig. : Gr. v. nocte maneque sumend.

As a rule homœopathic physicians prescribe bulk powders in doses of 3 or 5 grains, and homœopathic chemists keep trituration-scoops of these sizes in stock. In the absence of a scoop, however, it is usual to direct as much as covers a threepenny-piece as the equivalent of 3 grains, and a sixpenny-piece for 5 grains. This method of measuring is signified by a 3 or a 6 enclosed in a triangle, thus :—

 = as much as covers a threepenny-piece

 = „ „ sixpenny-piece.

Separate mortars should be kept for homœopathic work, and all operations should be conducted remote from strong-smelling substances.

Pilules and Globules present but little difficulty. The method of medication will be found in the Pharmacopœia. Globules are used much less in these days than formerly, although it was with globules that Hahnemann founded the system.

Compressed Tablets are not so popular with homœopaths as the trituration-tablets because of the manipulation required, which is calculated (in homœopathic opinion) to interfere with the purity of the medicine. Any trituration can be made into tablets, and any of the small machines advertised are suitable for the purpose.

Merc. biniodid. 3x gr. v.

Ft. tab. Mitte tales xxxvj.

The trituration is slightly damped with weak gum-water and passed through a moderately fine sieve, thus obtaining it in the form of minute granules. These are carefully dried, and then lightly sprayed with liquid paraffin—to prevent the powder from sticking to the moulds—and then compressed in the usual manner.

Trituration-tablets.—The moulds for this purpose are made for 50 and 100 tablets respectively, and for homœopathic work should preferably be of ivory or, failing that, of celluloid. Metallic moulds are unsuitable. The trituration is previously rubbed up with a little dry pulv. gum. acaciæ, then damped with spirit and water to the consistency of stiff putty, pressed with a bone spatula into the moulds, and set aside to dry.

APPLICATIONS.

Tinct. arnicæ θ ʒss.
Aquam destill. ad ʒviij.

Ft. lotio.

Sig. : For external application.

Direct a piece of lint in three folds to be soaked in the lotion, then applied to the bruise, and covered with oiled silk.

Linim. rhois ʒij.
Linim. saponis simplicis ʒiv.

Ft. linimentum.

Label : For external application.

Direct to be gently rubbed into the joint every four hours.

All homœopathic medicines should be dispensed in green or amber bottles, and these enclosed in card cases. The homœopathic department should be kept quite free of strong-smelling substances, and all utensils employed should be kept specially apart from the ordinary dispensing. Homœopaths have sharp noses, and object strongly to odours foreign to the medicine, so that a faint suggestion of lavender or turpentine on cork or bottle may lose you a good customer.

AUTOGRAPH PRESCRIPTIONS.

THE capability of pharmacists to decipher illegible caligraphy is so generally known as to be almost proverbial. It is a kind of expertness which they have acquired through long practice in reading the prescriptions of physicians. Their business requires this art; it has received official recognition by being made a part of the requirements of the qualifying examination, at which badly-written medical prescriptions have to be read by candidates, and teachers find it necessary to collect specimens of bad medical penmanship on behalf of their pupils.

The duty of the dispenser who has an illegible prescription presented to him has never been clearly defined; he has certainly a perfect right, legally, to refuse to compound a prescription which he cannot read; but it is believed that in the case of prescriptions which have previously been dispensed he is justified in doing his best. The best, however, may be a serious matter to the patient if it happens to be contrary to the intentions of the prescriber. It is far better for the dispenser that he should not risk his own reputation or the comfort of his customer by undertaking a task respecting which he is uncertain.

We print here examples of such prescriptions which have actually been dispensed. The study of these may afford assistance to any who have had little practice in deciphering bad writing. It is important to remember that in deciphering handwriting the peculiarities of the specimen should be

picked out. These frequently give a clue to the whole thing, and once a writer's style has been grasped, difficulties in the future appear to vanish. This is the case with the following:—

℞
 Perle. 3ss
 or ~~humb~~ ~~put~~ ~~shy~~
 or Olive 3x
 For y. gut ~~xxx~~
 + ~~an~~ ~~all~~

℞
 Calomel of 14
 Par Dover Dr
 Brum ~~Sum~~ ~~Dr~~
 Al ~~an~~ ~~I~~ ~~p~~
 Brum ~~th~~ ~~for~~ ~~xx~~ ~~2~~ ~~an~~ ~~all~~

The above is a prescription of Dr. Cecil W. Hastings, 'a well-known bad writer,' remarked a correspondent of *The Chemist and Druggist* at the time the facsimile was first published. The most difficult point about it is the quantity of the second ingredient of the 'drops'; opinions are divided as to whether it should be *mv.* or *3ss.* The former is, however, on the whole more in accordance with the writer's style, for, in the case of the other drachm signs, they are distinctly separated from the names of the ingredients, whereas the

opposite is the case with the 'ol. menth. pip.' The translation is :—

℞ Benzol. 3ij.
Ol. menth. pip. ℥v.
Ol. olivæ 3x.

F. mist. Cap. gutt. xxx. t. die.

C. W. H.

℞ Calomel. g. iv.
Pulv. Doveri ℥ij.
Bism. subnit. ℥ij.
Ol. carui q.s.

Misce. Ft. pil. xxiv. Cap. j. 2 horis.

C. W. H.

The next specimen is much less obscure :—

℞ Lig Strychnia
Muc. S. g. ; X^{IV}
Q Phosph. & 3X
Ole. ul. 3+V
Sp. Carm. 3P
a 3 i/

The quantity of liquor strychniæ looks like '℥xiv., but

this is not intended. Dr. Ward Cousins is the writer of this, and the rendering is :—

R̄	Liq. strychniæ	.	.	.	.	.	℥ iv.
	Quin. s.	.	.	.	.	.	gr. j.
	Ac. phosph. dil.	.	.	.	.	.	℥ x.
	Æther. chlor.	.	.	.	.	.	℥ xv.
	Syr. aurantii	.	.	.	.	.	℥ ss.
	Aq.	.	.	.	.	.	ad ℥ iss.

The subjoined prescription is an extremely carelessly written one, of the 'scrap of paper' class which cause numerous mistakes :—

By Dr. Ward Cousins
Quin. s. 1/2
Ac. phosph. dil. 1/2
Æther. chlor. 1/2
Syr. aurantii 1/2
Aq. 1/2

The peculiarity of this prescription lies in the contraction 'y' for 'every.' The proper rendering is :—

R̄	Disulph. quinæ	.	.	.	.	.	℥ ss.
	Bromid. sodii	.	.	.	.	.	℥ ij.
	Divid. in pulv. xij.						
	One y 8hrs.						
R̄	Liq. ferri chloroxidi.	.	.	.	.	.	℥ j.
	20 drops in water y [8 hours].						

The words in brackets are written along the left-hand side.

A most misleading prescription is the following :—

Atk. 3/4
3/4
2/3
1/2
1/4

No fewer than eight different renderings of this have been given by experienced dispensers. It was rendered as follows by the pharmacist who sent it to *The Chemist and Druggist* :—

Haust. ferri aper. bis.

Alum. ʒiv.

ʒij. ad Oss. aquam (*sic*) once day.

Coct. Cantharidis ʒij.
ʒij. Camphoræ ʒij.

This last is a carelessly written prescription, the second ingredient being particularly obscure ; but after careful examination the dispenser will render it :—

R. Aceti cantharidis ʒvj.
 Spir. camphoræ ʒij.

This is correct. There is little in the writing to guide the dispenser, but it is highly unlikely that the writer would mean 'Lin. camphoræ' (an oleaceous preparation) to be mixed with a vinegar.

This hitherto brief chapter has been so much valued by students that the opportunity of a new edition is taken to augment it considerably, and in order that the autographs may be used as exercises the correct renderings are placed at the end of the chapter. There are also included copies of prescriptions by the late Daniel Hanbury, F.R.S., when he was a comparatively young man engaged in dispensing prescriptions. These are given as an object-lesson to apprentices and assistants, who too frequently are as careless in their caligraphy as are some medical practitioners. Medicine and pharmacy are sufficiently onerous occupations to merit the most careful attention to the writing of anything which has to do with the health or lives of our fellow-men.

3 Rubeja Cupr
 Camp 3p
 Nigdyr Obled
 gr w
 Rub Lunn Co —
 pr 57
 the Great Rub Lunn

PRESCRIPTION B.

R. May Laponi 3p.
 Ours myk & many
 HCB

PRESCRIPTION C.

℞. Hemerod. extractum
 Cune. T. Ros.
 As directed
 1. Symplic. 3p
 2. Symplic. 3p
 Acid. Nitro Hy
 Dilut. 3p
 Symplic. 3p
 Symplic. 3p
 W. Squatula
 Cune. 3p
 Symplic. 3p
 3p of 4. 4p
 Cune. 3p

PRESCRIPTION D.

Mr. Marks

In 6212 2ij

In 6121 a 3/4

U. Li a d d d d

1 6212 2ij

2 Belland 3i

2 Mus. Va 3i

2 Garku 2 5
a 2 3 8

UH 1
Unlabeled 2 1/2 1/2 1/2
UH 2 1/2 14/100

Master J. Allen
 & husband
 Dr. Richard
 Allen
 26/5/05

PRESCRIPTION I.

2 Ruch. Valspar Co 35
 Valspar Chlute
 1/2 w
 & Dr. Ruch
 What Ruch

PRESCRIPTION J.

Mr Childs (Norwood)

R₁

℞. Morrhua pur ʒviij (filtr)
Sum coct men (augend ad amplicum) bis die
et post sequent cochl. compo

R₂

Acid sulph. dil ʒj
— Tannin gr. xij
— Hydro cyan. dil m ʒi
Tinct. Aurant. ʒss
Lys. Aurant ʒj
Inf. Aurant comp ad ʒviij

PRESCRIPTION L.

Mrs Baker

R₁

℞. Zinci valerianatis gr. viij
Ferri sulphat. gr. iij
Quina Disulphat. gr. x
Pil zhei comp gr. xij
Ext antheridiv gr. xvj
℞. carui gutt ij
Divide in pilulas xij. Sumat undam bis
in die

5/12/50

H.O

PRESCRIPTION M.

The following are transcriptions of the facsimiles given on the nine preceding pages :—

Prescription A.

This is one of the prescriptions of the late Dr. P. M. Kelty, Blackpool, and the following is the correct rendering :—

R̄	Infusi Cinch	.	.	.	.	.	℥iv.
	Quinin sulph.	.	.	.	.	.	℥ss.
	Acid. Sulph. Dil.	.	.	.	.	.	℥ij.
	Spt. Chloroform	.	.	.	.	.	℥iss.
	Syrupi Aunti [Aurantii]	.	.	.	.	.	℥j.
	Tinct. Nux Vomica	.	.	.	.	.	℥j.
	Aqua Pulegia	.	.	.	.	.	℥iij.

Cpt coch duo ampli 4tis horus.

P. M. K.

The first ingredient was the subject of considerable diversity of opinion when the prescription was printed in *The Chemist and Druggist*, the following solutions being sent in :—

Infusi Cinchonæ	Infusi Aurant.
Infusi Gent.	Infusi Quassiaæ
Infusi Gent. Co.	Infusi Quebracho
Infusi Buchu	Magnes. Sulph.

The last ingredient was also a bone of contention, but the greatest number of competitors plumped for aqua pulegii ; other renderings were :—

Aqua Quassiaæ	Aqua Picis Liquida
Aqua Destillat.	Aqua Qu. Ligni
Aqua Purificat.	Aqua Quilaya
Aqua Purifici	Aqua Disty
Aqua M. Piper.	Aqua Chloroformi
Aqua Puræ	Aqua Sulph. Ac.
Aqua Reliqua	Aqua Rubinat

Prescription B.

R̄	Pulv. jalapæ comp.	.	.	.	.	℥ss.
	Hydrarg. chlor. m.	.	.	.	.	gr. iv.
	Pulv. scam. co.	.	.	.	.	gr. vj.

M. fiat pulv. nctis.

Here the only difficulty is in the third ingredient, which may be rendered pulv. cinnam. co., pulv. sennæ. co., pulv.

licoric. co., pulv. doveris co., or pulv. linum co. ; but any careful dispenser would on reflection see that pulv. scammon. co. is the only reasonable constituent for such a powder. Hydrargyri chloridum mitius is the old name for calomel.

Prescription C.

℞ Ung. Lassarii ℥iss.
Dress night and morning.

H. C. B.

This is a New Zealand prescription, and well illustrates the necessity for the greatest care in reading before dispensing. The following are some of the erroneous renderings which were given of the 'scrip' by dispensers :—

Ung. saponis ceratis	Ung. resorcin.
Ung. saponis	Ung. simplicis
Ung. capsici	Ung. sabin.
Ung. scoparina	Inf. scoparii
Ung. lapis divin.	Ung. saturni
Ung. ac. boric.	Ung. Kaposi (β -naphthol)
Ung. simp. cerii	Ung. papain.
Ung. hyd. ammon.	Gly. papain.
Ung. supraren.	Ung. lap. ceruss.
Ung. lap. calam.	Ung. lapis
Ung. sulphuris	

There is much too wide a choice here for the serenity of the patient.

Prescription D.

℞ Himrod's asthmatic cure 1 box
As directed.

℞ Glycerol pepsinæ ℥ss.
Succus tarax.
Acid. nitro-hy. dilut. ℥ss.
Succus tarax. ℥j.
Syr. prunæ ℥j.
Tr. ignatiæ amaræ ℥ij.
Aq. ad ℥viiij.

S. : ℥ss. q.q. 4tâ horâ ex aquâ.

It will be observed that succus tarax. occurs twice but only once with the quantity.

Prescription E.

Mr. Marks.

Lin. crotn tig.,
 Lin opii aa. ℥ss.
 Ft. lin. as directed.

℞ Liq. opii sed. ℥iss.
 Tr. belladnæ ℥j.
 Tr. nux vom. ℥j.
 Tr. capsici ℥5.
 Aq. ad ℥8.

Ft. m.

Two tablespoonfuls three times a day.

‘Liq. opii sed.’ and ‘Liq. opii Bat.’ are the most likely renderings of the first ingredient in the mixture.

Prescription F.

℞ A bent brush.

℞ Ol. pin. pu.
 Ol. eucalypt. āā ℥j.

M.

Sig. Drops for Inhaler. Use from 5 to 10 with hot water.

℞ Gly. acid. carbol. et boracis et tan. ℥j.
 Sig. Apply to throat with brush.

Prescription G.

℞ Bismuth. carb. ℥iss.
 Sod. bicarb. ℥iss.
 Sp. chlorof. ℥iss.
 Pulv. trag. co. ℥iss.
 Aq. menth. pip. ad ℥viiij.

℥j. t.d.s. at intervals of 4 hours.

W. T. G.

A peculiarity in this prescription is the placing of the ℥iss. signs above the lines. The directions are a very real difficulty.

Prescription H.

This is a cypher except to Blairgowrie chemists. It reads :—

Rept. Mgt Scott's Mixture.

Rattray Parish Council.

Prescription I.

Master J. Allen.

℞ Ungt. Ic[h]tholi ʒi.

Sig. M.D. Utd.

Prescription J.

℞ Pulv. jalap. co. ʒj.

Hydrarg. chlor. m. gr. i

M. fiat pulv.

Stat. sumend.

Prescription K

is another of the late Dr. P. M. Kelty's efforts, and Mr. H. P. Withers, chemist, Blackpool, gives the following as the exact rendering :—

Decoct. Sarsapilla Co Consnt ʒj.

Potass Chlorid ʒij.

Liqr Arsinecl ʒj.

Tnt Colchic ʒij.

Syrupi Aunti ʒj.

Aqua Cajeput ʒvj.

Capt Coch duo ter die

Pil Chlord Hydgr. Cmp ʒj.

Ext. Aloes ʒss.

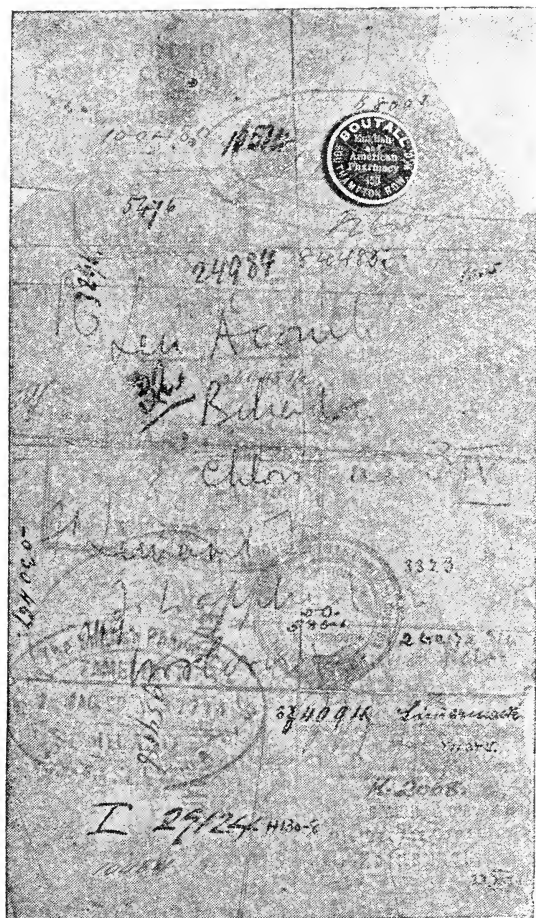
Divide Pil xvij.

Unam mane et nocte

Prescriptions L and M

are facsimiles from the 1855 prescription-book of Messrs. Allen & Hanburys, Plough Court, London, E.C. These were copied into the book by Mr. Daniel Hanbury as already explained.

Facsimile prescriptions are given in *The Chemist and Druggist* periodically.



This is one side of a prescription, the reverse being quite as shamefully stamped by chemists who have dispensed it.

Transcription

℞ Lin. Aconiti
 „ Belladon.
 „ Chlor. aa ʒiv.
 Ft. Liniment.

To be applied with a brush over the seat of pain.

EXAMINATION PRESCRIPTIONS.

THOSE who use this volume preparatory to entering for a qualifying pharmaceutical examination will find the following prescriptions useful for practice. They have been given by the Boards of Examiners in Edinburgh and London since 1898. We do not comment upon these prescriptions, the object of printing them here being to make them exercises for students. It will be noticed that four to six articles are generally given to each candidate, including a British Pharmacopœia galenical to make, and three hours is allowed in which to do the work. That is at least an hour longer than should be taken by a competent dispenser.¹

I.
 Inj. morph. hypoderm. ℥iij.
 (B.P. process.) ℥xij. 1 gr.
 Ext. belladon. gr. j.
 Fiat suppos. Mitte vj.
 One to be used when required.
 Acid. boric. 2 %
 Zinci oxid. ℥ss.
 Pulv. tragacanth. gr. x.
 Glycerin. ℥ij.
 Aq. ad ℥ij.
 Fiat pigment.
 To be used with a camel-hair
 brush.
 Ferri sulph. exsic. gr. iij.
 Fiat pil. Mitte xij. Silver.
 One night and morning.

Mist. ol. ricini (B.P.) ℥iv.

II.

Mist. ferri co. ℥vj.
 ℥j. twice daily.

Ung. hyd. co., B.P. qty., in
 drachms.

‘The Ointment.’

Creosoti mj.
 Pulv. capsici gr. ss.
 Ft. pil. Mitte xxiv. Varnish.
 j. t.d.s.

Ext. opii gr. vj.
 Ext. bellad. gr. ij.
 Ol. theobrom. q.s.
 Ft. suppos. vj.

¹ For other sets of prescriptions, see ‘Minor Experiences,’ published at the Offices of *The Chemist and Druggist*, price 2s. 6d.

III.

Make 4 fl. oz. syr. calcis
lactophosph.

Ferri et quin. cit. . . gr. ij.
Inf. calumbæ ad . . ʒss.

Mitte ʒiv.

Sig. : To be taken after dinner
daily.

Quin. sulph. . . gr. ij.
Ft. pil. Mitte vj.

Sig. : One when the pain recurs.

Pot. chlor. . . ʒj.
Ac. hydrochlor. . . mxxv.
Syr. aurantii . . ʒss.
Aq. . . ad ʒvj.

M.

Sig. : The chlorinated gargle.

Make 2 fl. oz. syr. aromat.

IV.

Linimentum terebinth.,
¼ B.P. quantity.

Hyd. perchlor. . . gr. ʒ
Tr. tolu. . . ʒj.
Aq. . . ad ʒiv.

Fiat lotio.

Ferri arsenatis . . gr. ⅒
Quin. sulph. . . gr. j.

Ft. pil. Mitte xxiv. Silver.

Sulphonal. . . ʒj.
Pulv. tragacanth. . . gr. xx.
Inf. aurant. . . ad ʒvj.

Fiat mistura.

ʒj. t.d.s.

Emp. picis . . 6 × 4 inches
Spread on leather.

V.

Hyd. c̄ cretâ . . gr. iij.
M. Ft. pil. Mitte vj.

Hyd. iodid. rub. . . gr. j.
Morph. mur. . . gr. ij.

M. Ft. suppos. vj.

Send a belladonna-plaster, the size
of the prescription-paper, with
an adhesive margin.

Send quite cold—

Oss. liq. plumbi.

VI.

Tr. opii . . ʒj.
Tr. catechu . . ʒij.
Mist. cretæ . . ad ʒvj.

⅙ 4tis horis.

Ferri arsenat. . . gr. ⅓
Ext. nuc. vom. . . gr. ¼
Quinin. sulph. . . gr. j.

Fiat pil. Mitte xij. Varnish.

Emp. bellad. 6 inches diam. for
the breast.

Santonin. . . gr. x.
Ol. ricini . . ʒj.
Muc. acac. . . ʒss.
Aq. . . ad ʒiv.

½ pro dose.

Aloin. . . gr. ij.
Ext. bellad. . . gr. j.
Ol. theobrom. . . q.s.

Fiat suppos. Mitte vj.

VII.

Make ⅔ B.P. quantity syr. ferri
iodid.

Menthol plaster. Spread one
4" × 4".

Ferri sulph. . . . gr. $\frac{1}{2}$
 Ext. belladon. . . . gr. $\frac{1}{2}$
 Ext. nucis vomic. . . . gr. $\frac{1}{2}$
 Pil. rhei co. . . . gr. 2
 Misce. Fiat pilula. Mitte xij.
 Silver.
 One night and morning.

Olei ricini ʒj.
 Pulv. acaciæ q.s.
 Aquam ad ʒiij.
 $\frac{1}{4}$ th part for a dose. Divide bottle.
 Pulv. opii gr. $\frac{1}{6}$
 Sacch. lact. . . . gr. j.
 Ft. pulv. Mitte vj.
 One every night.

VIII.

Lotio. plumbi fort. . . . Oss.
 Blaud's pill gr. iv.
 Mitte xxiv. Varnish.
 Pot. iod. . . . ʒj.
 Mist. ferri co. . . . ad ʒvj.
 Emp. bellad. . . . 5 × 4

IX.

Sol. hyd. perchlor. . . . $\frac{1}{4}$ %
 Mitte ʒiv.
 Emp. menthol. . . . 4 × 3
 Menthol. . . . 2 %
 Adip. præp. . . . ad ʒj.
 Inj. morph. hypoderm. . . ʒss.
 Pot. iod. . . . ʒj.
 Liq. Donovan. . . . ʒj.
 Liq. strychnin. . . . ʒj.
 Liq. hyd. perchlor. . . . ʒj.
 Syr. aurant. . . . ʒiv.
 Inf. aurant. co. . . . ad ʒvj.

You have to make ʒj. liq. Donovan, and your own inf. aurantii co.

X.

Bismuth. subnit. . . . gr. iss.
 Pepsin. . . . gr. iss.
 Quin. sulph. . . . gr. j.
 Strych. . . . gr. $\frac{1}{40}$
 M. et ft. pil. Mitte tales xxiv.
 Sig. : j. nocte et mane.

Acid. salicylic. . . . 12 %
 Zinci oxid. . . . 8 %
 Acid. boric. . . . 9 %
 P. cret. gall. . . . ad ʒij.
 M.

Bismuth. cit. . . . gr. 160
 Liq. ammon. . . . q.s.
 Aq. . . . ad ʒiv.

M.

Sig. : ʒj. more dicto.

Quin. sulph. . . . gr. iss.
 Antifebrin. . . . gr. x.
 Ft. pulv. Mitte xij. Cachets.

Ext. opii. . . . gr. $\frac{1}{4}$
 Ol. theobrom. . . . q.s.

Ft. sup. Mitte sex.

XI.

Pil. ferri gr. v.
 Mitte 24. Varnish.

Ung. eucalypti. . . . ʒj.

Suppos. plumbi co. Mitte vj.

Bismuth. carb. . . . 1 gramme
 Sod. bicarb. . . . 2 grammes

Ft. pulv. vj. To be dispensed in cachets.

A powder containing sod. salicyl. to be granulated.

XII.

Make Lin. terebinth. ʒiv .

Camphoræ,

Sulph. sublim. aa . . gr. j.

Ft. pil. j. Mitte xxiv.

Cocainæ . . . gr. iij.

Ol. carbolici 2 % . ad ʒij .

M.

Pot. bicarb. . . ʒiss .

Ac. hydrocy. dil. . . mxiij .

Aq. . . ad ʒvj .

M. ʒj . with a powder.

P. acid. cit. . . gr. xv.

Mitte vj.

XIII.

Emp. resinæ 6 x 6 on leather.

Zinci sulph. . . gr. iij.

Ext. gent. . . gr. xviiij.

Ft. pil. vj. Varnish.

Ung. chrysarobini . . ʒij .

Ol. terebinth. . . ʒiv .

P. g. acaciæ . . . q.s.

Aq. . . ad ʒiv .

M.

Sig. : The emulsion.

Pot. bicarb. . . ʒj .

Ammon. carb. . . ʒss .

Spt. amm. arom. . . ʒiss .

Spt. chlorof. . . ʒj .

Tr. aurant. . . ʒij .

Inf. gent. co. . . ad ʒvj .

M. ʒj . ter die c. p. acidi citrici

q.s. Mitte pulveres vj.

XIV.

Glyc. plumbi subacet., $\frac{1}{8}$ th B.P.
quantity.

Suppos. morph. B.P. vj.

Ext. aloes, B.P. . . gr. vj.

Saponis pulv. . . gr. vj

Ext. bellad. . . gr. $\frac{1}{4}$

Ext. nuc. vom. . . gr. $\frac{1}{2}$

Ft. pil. Mitte vj. Silver.

Acid. gallic. . . ʒj .

Acid. sulph. dil. . . mxx .

Aq. . . ad ʒiv .

M. $\frac{1}{4}$ part three times a day.

(Divide your own bottle.)

Pulv. Doveri . . gr. iv.

Ft. pil. Mitte vj. Varnish.

XV.

Butyl. chloral. hyd. . gr. iv.

Gelseminin. hydrochlor. . gr. $\frac{1}{200}$

Ft. pil. Mitte xij.

Ext. hyos. . . gr. iij.

Camphor. . . gr j.

Morph. hydroch. . . gr. $\frac{1}{8}$

Ol. theobrom. . . q.s.

Ft. suppos. Mitte vj.

Hyd. perchlor. . . .01 %

Aq. . . ʒvj .

M.

Spt. chlorof. . . mxx .

Ammon. carb. . . gr. iij.

Inf. digitalis . . ad ʒss .

Sig. : To be taken thrice daily.

Mitte ʒvj .

Menthol. . . gr. $\frac{1}{8}$

Sodii bicarb. . . gr. x.

Bismuth. carb. . . gr. v.

M. Ft. pulv. Mitte tales vj.

XVI.

Make 2 fl. oz. syr. aromat., B.P.

Make about 4 fl. oz. syr. calcii
lactophosph.

Quin. sulph. . . . gr. iv.
Ft. pil. j. Mitte viij.

Ferri quin. cit. . . . gr. ij.
Inf. calumbæ . . . 3ss.
M.

To be taken thrice daily, after
food. Mitte 3iv.

Pot. chlor. . . . 3j.
Acid. hydrochlor. . . ʒxvj.
Aq. . . . ad 3vj.
M. et gargarisma chlorinatum fiat.

XVII.

Make 6 belladonna suppositories,
B.P.

Make a small quantity of sodii
citro-tart. efferv.

Acid. boric. . . . 10.0 %
Pulv. amyli . . . 10.0 %
Pulv. cret. gall. . . 80.0 %
Mitte 3j.

Sodii biborat. . . . 3j.
Sodii bicarb. . . . 3j.
Glycerini 3j.
Aq. . . . ad 3vj.

Sig. : The gargle.

Ext. euonymi sic. . . gr. iss.
Pil. rhei co. . . . gr. iiss.

Ft. pil. Mitte xij.

Sig. : j. h.s.

XVIII.

Make 1 oz. glycerinum amyli.

Potass. bromid. . . . 3ij.
Syr. zingib. . . . 3j.
Inf. lupuli . . . ad 3vj.
M.

Sig. : A sixth part at bedtime.

Make a few glycerin supposito-
ries. (Capacity of mould about
60 minims.)

Pulv. rhei gr. ij.
Pulv. sodii bicarb. . . gr. x.
Pulv. aromat. . . . gr. j.
M. Ft. pulv. Mitte x.

Pulv. aloes gr. j.
Pulv. zingiberis . . . gr. j.
Creosoti gtt. ss.
M. Ft. pil. j. Mitte viij.

Sig. : Take at bedtime.

XIX.

Make lin. potass. iodid. c. sapone
(about 2 oz.).

Bismuth. subnit. . . gr. vj.
Ol. theobrom. . . . q.s.
Ft. suppos. Mitte viij.

Sig. : To be used as directed.

Acidi arseniosi . . . gr. $\frac{1}{28}$
Ext. nuc. vom. . . . gr. $\frac{1}{4}$
Ferri sulph. . . . gr. ij.
Ft. pil. Mitte xv. Varnish.
Take one three times a day.

Ext. gentian. . . . 3j.
Sodii bicarb. . . . 3ij.
Aq. . . . ad 3vij.
Ft. mist.

Sig. : An eighth part twice a day.

Magnes. sulphat. . . 3j.
Potass. bicarb. . . . 3iij.
Tr. nuc. vom. . . . 3ij.
Aq. . . . ad 3vj.
Ft. mist. Cap. 3ss. ter in die.

XX.

Ext. cascar. sagrad. liq. ʒij.
 Tr. quassiaë . . . ʒij.
 Glycerin. . . ʒj.
 Inf. gent. co. . . ad ʒviiij.

M. ʒj. t.d.s.

Ext. cannabis ind. . . gr. ss.
 Camphoræ . . . gr. ij.
 Ft. pil. Mitte xij. Silver.

Ext. filicis liq. . . ʒj.
 Pulv. tragac. . . gr. x.
 Ess. menth. pip. . . gtt. x.
 Aq. . . ad ʒiiij.
 Ft. mist. Half for a dose.

Suppos. acid. carbol., B.P., vj.

Ung. plumbi carb. . ʒij.

XXI.

Make $\frac{1}{4}$ B.P. qty. ung. zinci
 oleatis.

Pil. quinin. sulph. . . gr. v.
 Ferri arsenat. . . gr. $\frac{1}{15}$
 Ft. pil. Mitte xij. Varnish.

Hydrarg. biniod. . . gr. j.
 Ol. theobrom. . . q.s.

M. Ft. suppos. j.

Lot. hyd. nigræ . . ʒvj.

Make $\frac{1}{2}$ oz. of 5-per-cent. solution
 of cocaine hydrochloride.

XXII.

Dec. aloes co., $\frac{1}{4}$ B.P. quantity.

Bismuthi carbonatis . ʒij.
 Sodii carbonatis . . ʒj.
 Pulv. tragacanth. . . gr. iij.
 Aq. . . ad ʒvj.

M.

Ext. euonymi sic. . . gr. iv.
 Res. podophylli . . gr. vj.
 Ft. pil. xij.

Ext. aloes barb. . . gr. iij.
 Ft. pil. Mitte xij.

Suppos. plumbi co. Mitte vj.
 Blister for left ear.

XXIII.

Camphor. . . gr. xxiv.
 Ext. hyoscy. . . gr. xij.
 Fiant pil. xij. Arg.

Mist. ferri co. . . ʒvj.

Ung. hyd. nit., B.P. . 2 oz.

Sodii bicarb. . . ʒiss.
 Spt. chlorof. . . ʒiss.
 Acid. hydrocy. dil. . mxxiv.
 Infus. rhei . . ad ʒvj.
 Ft. mist.

Ung. hydrarg. . . ʒss.
 Plumbi iodid. . . gr. xx.
 Ft. suppos. vj.

XXIV.

Potass. acid. tart. } æquales partes
 Sulphuris } ad ʒj.
 Ft. pulvis.

Hyd. c. cretâ . . gr. iij.
 Pulv. ipec. . . gr. ss.
 Ft. pil. Mitte xij.

Acidi sulphurosi . . ʒij.
 Glycerini . . ʒj.
 Mist. amygdalæ . . ad ʒiiij.
 M.

Ext. ergotæ . . gr. iij.
 Ol. theobrom. . . q.s.
 Ft. suppos. Mitte vj.

Sapo. moll. . . . ʒij.
 S.V.R. . . . ʒj.
 M.

Sig. : The fluid soap.

xxv.

Send a solution of HgCl_2 ʒj. so that ʒj. with water to Oj. will make 1-4,000 of HgCl_2 .

Calcii sulphid. . . . gr. $\frac{1}{9}$
 Ft. pil. Mitte tales xij. S.A.
 varnish. j. t.d.s.

Ammon. chlorid. . . . gr. x.
 Ext. glycyrrh. . . . ℥xv.
 Spt. chlorof. . . . ℥x.
 Aq. . . . ad ʒss.
 4tis horis. Mitte ʒvj.

Make ʒiv. liq. plumbi subacet. fort.

Paraff. molle . . . ad ʒss.
 Cocainæ . . . 1%
 Ft. ung.

xxvi.

Bismuthi salicyl. . . ʒij.
 Pulv. tragacanth. . ʒss.
 Tr. card. co. . . ʒiv.
 Aq. . . . ad ʒvj.

Misce. One-sixth part to be taken three times a day.

Ung. hyd. ox. rub. . ʒij.
 Sig. : M.d.u.

Ol. terebinth. . . ʒj.
 Mucilaginis . . . q.s.
 Aq. . . . ad ʒiss.
 Ft. haust. Statim sumend.

Emp. hydrarg. $2\frac{1}{4}$ oz. (about), and spread a plaster of the same 4×3 .

xxvii.

Make ʒxx. dec. aloes co.

Pil. ferri . . . gr. v.
 Mitte xxx. Varnish.

Make lotio. hydrarg. nig. ʒx.

Potass. bromid. . . ʒij.
 Potass. iodid. . . ʒij.
 Tr. sumbul . . . ʒss.
 Aq. . . . ad ʒvj.
 Misce. ʒss. t.d.s.

Opii . . . ʒj.
 Adipis benz. . . ʒj.
 Ft. unguent.

xxviii.

Make 200 c.c. syrup. ferri iodidi.
 Send in a tared flask.

Potass. iodidi . . ʒss.
 Tr. guaiaci ammon. . ʒiv.
 Tr. cinchonæ . . ʒiv.
 Mucilag. . . q.s.
 Aq. . . . ad ʒvj.
 Ft. mist.
 Sig. : $\frac{1}{6}$ bis die.

Hydrarg. perchlor. . gr. j.
 Ft. pil. xxx. Varnish.
 Sig. : j. ter in die.

Suppos. acid. tannic. . vj.
 Sig. : One every night.

Send a blister 4×2 .

xxix.

Make 4 oz. strong solution of lead subacetate.

Tannic-acid suppositories, B.P., vj.

Liq. arsenic. hydrochlor. miiij.

Liq. strychn. hydrochlor. miiij.

Tr. strophanthi . . . miv.

Inf. digitalis . . . ad 3j.

Misce. Mitte 3iij.

Sig. : Bis vel ter in die ex aquâ sumend.

Pil. coloc. et hyoscyam. gr. iv.

Calomelanos . . . gr. j.

Ft. pil. ij. H.s.s. Mitte xij. Arg.

Lot. acid. boric. (1 in 50) 3ij.

Aquæ rosæ . . . 3ij.

M.

Sig. : The eye-lotion.

XXX.

Make syr. Eastonii 3iv.

Ferri redact. . . . gr. j.

Phosphori gr. $\frac{1}{50}$

Ext. nucis vom. . . . gr. $\frac{1}{4}$

Ft. pil. Mitte xij.

Ol. terebinth. . . . 3ij.

Tr. camph. co. . . . 3ij.

Mucilag. . . . q.s.

Aq. . . . ad 3viiij.

Ft. mist.

Hydrarg. oxid. flav. . . gr. ij.

Paraffin. [? mollis] alb. 3j.

Misce.

Emp. bellad. 4 × 6.

XXXI.

Make syr. Eastonii 3iv.

Emp. belladon. 6 × 4.

Make and spread.

Boracis 3j.

Zinc. oxid. . . . 3j.

Liq. picis 3ij.

Adip. . . . ad 3iss.

Fiat unguent.

Make mist. ferri co. 3vj.

Ext. nucis vom. . . . gr. $\frac{1}{6}$

Pulv. digitalis gr. $\frac{1}{8}$

Acid. arsenios. . . . gr. $\frac{1}{60}$

Excip. . . . q.s.

Ft. pil. Mitte xxv.

XXXII.

Ammon. carb. . . . gr. v.

Ammon. chlor. . . . gr. iij.

Ext. cinch. liq. . . . 3iss.

Aq. . . . ad 3ss.

Ft. dosis. Mitte 3vj.

Sexta quâque horâ sum.

Make 3iv. of a solution that shall contain 8.25 per cent. of reagent acetic acid.

Suppos. acid. carbol., B.P.

Mitte vj.

Emp. menthol. 6 × 4.

Hydrarg. c. cretâ . . . gr. iij.

Ft. pil. Mitte xij.

XXXIII.

Mist. ferri co. 3vj.

Lotio hydrarg. nig. 3iv.

Ferri et quin. cit. . . . gr. iij.

Strychn. . . . gr. $\frac{1}{50}$

Ft. pil. Mitte xij.

Ext. bellad. vir. . . . 3ss.

Glycerin. . . . ad 3iss.

Ft. pigment.

XXXIV.

Ext. hyoscyam. . . gr. $\frac{1}{4}$
 Pil. col. co. . . gr. iiii.
 Podophyllin. . . gr. $\frac{1}{8}$
 Ft. pil. Mitte xij.

Spt. ammon. co. . . ʒij .
 Spt. chlorof. . . ʒiss .
 Tr. zingib. . . ʒij .
 Inf. cascar. . . ad ʒvj .
 Ft. mist.

Pars sexta bis terve die.

Menthol. . . gr. 45
 Ol. amygd. . . ad ʒj .
 To be applied to the nostrils.

Liq. plumb. subacet.
 Mitte 130 grammes.

XXXV.

Tr. hyoscyam. . . ʒss .
 Ol. terebinth. . . ʒj .
 Aq. . . ad ʒiv .
 Ft. emulsio.

Iodoform. . . gr. ij.
 Bismuth. carb. . . gr. v.
 Ft. suppos. Mitte vj.

Calaminæ . . . ʒij .
 Zinci oxidi . . . ʒiv .
 Glycerini . . . ʒiv .
 Aq. . . ad ʒiv .
 Ft. lotio.

Acid. arsenios. . . gr. $\frac{1}{24}$
 Strychninæ . . . gr. $\frac{1}{80}$
 Ft. pil. Mitte xij.

XXXVI.

Prepare emp. cantharidis, and
 spread a blister 3 inches by 4
 inches.

Ferri et ammon. cit. . . ʒiss .
 Liq. arsenicalis . . . ʒss .
 Glycerini . . . ʒiv .
 Aq. destill. . . ad ʒvj .
 Misce.

Sig. : One tablespoonful to be
 taken three times a day, after
 meals.

Prepare 2 oz. solution of am-
 monium acetate.

Camphor. . . gr. xij.
 Menthol. . . gr. viij.
 Ung. hydrarg. . . ʒj .
 Adip. benz. . . ʒiv .
 M:

Apply freely, then cover with
 boric lint.

Pil. plumbi c. opio . . gr. iij.
 Mitte viij. Varnish.

XXXVII.

Make six glycerin suppositories.
 (Capacity of mould 1 fl. dr.)

Tr. digitalis . . . ʒij .
 Tr. cinchonæ . . . ʒij .
 Mist. ammoniaci . . ad ʒij .
 M. ʒss . ter die.

Make 2 fl. oz. syr. chloral. hyd.

Zinci oxid. . . . ʒij .
 Glycerin. . . . ʒvj .
 Gelatin. . . . ʒvij .
 Aq. . . . ʒvj .

M.S.A.

Sig. : Glycerin-and-zinc-paste.

Magnes. sulph. . . . ʒvj .
 Magnes. carb. . . . ʒij .
 Ft. pulv. vj.

XXXVIII.

Make six carbolic-acid suppositories.

Acid. arsenios. . . gr. $\frac{1}{24}$
 Ext. nucis vom. . . gr. $\frac{1}{32}$
 Ferri carb. sacch. . . gr. iiss.
 Ft. pil. Mitte xxiv.

Myrrh. ʒss.
 Boracis ʒj.
 Aq. chloroformi . . . ad ʒvj.
 Ft. gargarisma.
 Sig. : To be used frequently.

Make 1 oz. of effervescent antipyrin from the following formula :
 Sodii bicarb., 46 ; tartaric acid, 16 ; citric acid, 24 ; sacchari, 16 ; phenazone, 8.

Hydrarg. biniod. . . gr. x.
 Cere flav. ʒj.
 Ol. olivæ ʒiij.
 Adip. præp. ʒvj.
 Ft. unguentum.
 Sig. : To be used as directed.

XXXIX.

Hydrarg. perchlor. . gr. x.
 Acidi hydrochlor. . ʒj.
 Aq. ad ʒiij.
 M.
 Sig. : 'Poison.' The liquor.
 Use as directed.

Ammon. carb. . . gr. xxxij.
 Vin. ipecac. . . . ʒiss.
 Tr. hyoscyami . . . ʒiss.
 Spt. chloroformi . . ʒij.
 Infus. senegæ . . . ad ʒiv.
 Misce.

Sig. : Two teaspoonfuls three times a day.

Aloin. gr. xij.
 Ferri sulph. gr. vj.
 Ext. nucis vom. . . gr. iss.
 Pulv. saponis dur. . gr. vj.
 Pil. rhei co. ad ʒss.

Divide in pil. xij.

Signe : One at bedtime.

XL.

Ammon. brom. . . . ʒij.
 Ammon. chlor. . . . ʒiv.
 Tr. cannab. ind. . . ʒss.
 Tr. myrrhæ ʒss.
 Aq. camph. ad ʒvj.
 ʒss. every four hours in water.

Two fly blisters, one for each ear.

Ol. olivæ ʒj.
 Aq. rosæ ʒj.
 Lin. tereb. ad ʒvj.
 Ft. lin.
 Liq. plumbi subacet. . ʒij.
 Glycer. boracis . . . ʒiv.
 Ung. zinci ʒx.
 Ft. ung.

XLI.

Ext. ergotæ gr. iij.
 Ol. theobrom. . . . q.s.
 Fiant suppos. ij. M.d.u.
 Ext. filicis liq. . . . ʒiv.
 Pulv. acaciæ ʒss.
 Aq. cinnam. ad . . . ʒiij.

Fiant haust. ij.

In the morning.

Ferri sulph. exsic. . gr. ij.
 Sodii carb. gr. j.
 Ac. arsenios. gr. $\frac{1}{8}$

Fiant pilul. ij. Mitte xij.

Sig. : One after food. Varnish.

Infus. digitalis . . . ʒij.
 Syr. aromat. . . . ʒj.
 Mist. ammoniaci . . . ʒiij.

Sig. : ʒij. ter die.

Make 20 per cent. lin. camphoræ.

Send 50 grammes.

XLII.

Syr. ferri, quin., et strychn. phos. ʒiv.
 ʒj. t.d.s. p.c.

Ext. filicis liq. . . . ʒj.
 Mucilag. . . . ʒj.
 Aq. camph. . . . ad ʒj.
 Ft. haust. Mitte tales ij. j. h.s.s.

Hyd. subchlor. . . . gr. j.
 Ol. m. pip. . . . gtt. j.
 Ext. aloes gr. ij.
 Ft. pil. Mitte xij. Silver. j. h.s.s.

Pot. iodid. . . . ʒiss.
 Liq. hyd. perchlor. . . ʒiij.
 Tr. hyoscy. . . . ʒiij.
 Inf. quass. . . . ad ʒvj.
 M.

Sig. : ʒss. t.d.s. p.c.

Hyd. c. cretâ gr. xij.
 Pulv. rhei gr. xxx.
 Sodii bicarb. . . . gr. xxx.
 Ft. cachet vj. j. t.d.s. p.c.

XLIII.

Make a small quantity of ung. zinc. oleat.

Sodii sulphocarbolat. . ʒiss.
 Spt. æther. nit. . . . ʒvj.
 Spt. chloroformi . . . ʒij.
 Inf. gent. co. . . . ad ʒvj.
 ʒss. bis in die.

Make a small quantity of acid. sulph. dil.

Sulphur. sublim. . . . ʒss.
 Zinci oxid. . . . ʒss.
 Ung. acid. boric. . . . ad ʒj.
 Fiat ung.

Sodii sulphat. . . . ʒj.
 Divide in chartas iv.
 Sig. : One occasionally.

XLIV.

Prepare 2 oz. dilute sulphuric acid.

Hamamelin. . . . gr. j.
 Ext. belladon. virid. . . gr. $\frac{3}{4}$
 M. ft. suppos. Mitte tales v.
 Sig. : One as directed.

Santonin. . . . gr. ij.
 Hydrarg. subchlor. . . gr. $\frac{1}{8}$
 Sacch. alb. pulv. . . . gr. ij.
 M. ft. pulv. Mitte tales viij.
 Sig. : The worm powders. To be taken at night.

Hydrarg. ammon. . . ʒj.
 Tr. benz. comp. . . . ʒij.
 Adipis lanæ hydr. . . ʒvj.
 Paraff. moll. flav. . . ad ʒij.
 M. ft. ung. M.d.u.

Magnes. ponderos. . . ʒss.
 Magnes. sulph. . . . ʒij.
 Bism. carbonat. . . . ʒiij.
 Pulveris rhei ʒj.
 Aq. menthæ ad ʒviiij.
 M. ft. mist.

Sig. : ʒss. ter in die post cibum sumend.

XLV.

Menthol. . . . ʒss.
 Lin. chloroformi . . . ʒj.
 Ft. lin.
 To be applied as directed.

Ext. nucis vom. . . gr. ss.
 Ext. cascaræ sag. . . gr. ij.
 Ext. euonymi sic. . . gr. ij.

Fiat pil. Mitte xij.

One pill to be taken every alternate night or twice a week. Varnished.

Potass. iodid. . . ʒss.
 Sodii bicarb. . . gr. LX.
 Lith. carb. . . gr. XL.
 Quin. sulphatis . . gr. xxx.
 Pulv. tragac. co. . ʒiss.
 Tr. card. co. . ʒiv.
 Aq. chloroform. . ad ʒviii.

Ft. mistura.

Sumat $\frac{1}{8}$ ter die.

Santonin. . . gr. vj.
 Ol. theobrom. . . q.s.

Ft. suppos. Mitte iij.

Send 8 oz. mist. ammoniaci.

XLVI.

Prepare 100 grammes sodii phosphas effervescens.

Menthol. . . gr. xij.
 Tr. rhei . . ʒij.
 Glycerini . . ʒij.
 Inf. quassia. . ad ʒvj.

Ft. mistura.

Sig. : ʒss. t.d.s. p.c.

Hyd. c. cretâ . . gr. j.
 Ext. belladon. . . gr. $\frac{1}{12}$

Ft. pil. Mitte xxj.

Emp. bellad. 6 × 4.

Ol. ricini . . ʒij.
 Ol. menth. pip. . mij.
 Pulv. acacia. . ʒiss.
 Aquam . . ad ʒiss.

Fiat emulsio.

XLVII.

Magnes. sulph. . . gr. XL.
 Syr. aurantii . . ʒj.
 Inf. rosæ acid. . ad ʒj.

Ft. haust. Mitte vj.

Prepare 4 oz. ext. cascaræ liq., using the moistened powder provided.

Calc. sulph. . . gr. j.
 Ft. pil. t.d.s. Mitte xxiv. Silver.

Prepare 40 grammes ung. hyd. iod. rub.

Prepare six compound lead suppositories.

XLVIII.

Make a little hydrarg. oleas.

Make the B.P. quantity of injectio apomorphinae hypodermica.

Hyd. subchlor. . . gr. ij.
 Pil. aloes soc. . . gr. iv.

Ft. pil.

Sig. : To be taken at bedtime.

Mitte vj.

Ammon. carb. . . gr. v.
 Spt. chloroform. . . mxx.
 Inf. senegæ . . ad ʒss.

Sig. : Three times a day. Mitte ʒvj.

Glycerini . . ʒvj.
 Sol. acid. boric. sat. . ʒiv.

Ft. gargar.

Sig. : Use every hour.

XLIX.

Send half the B.P. quantity (in ounces) of ointment of oleate of zinc.

Make 4 fl. oz. of carbolised oil (5-per-cent.).

Paraldehydi . . . ʒj.
 Tr. aurant. . . . mxx.
 Glycerini ʒij.
 Aq. . . . ad ʒiss.

To be taken at bedtime. Mitte ʒvj.

Chrysarobin. . . . gr. XL.
 Iodoform. . . . gr. xx.
 Adipis benz. . . . ʒj.

Ft. unguent. m.d.ut.

Sodii arsenatis . . . gr. $\frac{1}{30}$
 Ext. bellad. vir. . . . gr. $\frac{1}{4}$
 Ext. nucis vom. . . . gr. $\frac{1}{3}$
 Pil. rhei co. . . . gr. ij.

Ft. pilula. Mitte xxiv. Silver.

One three times daily one hour before meals.

L.

Make 100 c.c. liq. plumbi acet. fort. and take its specific gravity.

Tr. ferri perch. . . . ʒij.
 Tr. digitalis ʒiss.
 Spt. chlorof. . . . ʒj.
 Aquam ad ʒvj.

M. ft. mist. ʒss. t.d.s.

Menthol. . . . gr. xv.
 Paraffin. alb. liq. . . ʒj.

Ft. sol.

To be sprayed up the nostrils night and morning.

Pulv. acid. boric. . . ʒss.
 Zinci oxid. . . . ʒss.
 Liq. carbonis deterg. . mxx.
 Adipem ad ʒj.

Ft. ung. m.d.u.

Hyd. iod. rub. gr. j., excip. q.s. ut ft. pil. xx.

Sig. : j. three times a day.

LI.

Send 200 c.c. of lin. terebinth.

Suppos. morph. B.P. Mitte vj.

Salol. gr. x.
 Pulv. tragacanth. . . gr. v.
 Tr. hyoscyami mxx.
 Inf. buchu ad ʒj.
 Ft. haustus.

Acid. salicylic. . . . 2 per cent.
 Ichthyol 5 per cent.
 Lanolini,
 Vaselini aa. ʒss.
 Ft. ung.

Hyd. c. cretâ gr. ij.
 Pulv. ipecac. . . . gr. ij.
 Pil. coloc. et hyos. . . gr. iv.
 Ol. carui m j.

Ft. pil. ij. Mitte xij. Silver.

LII.

Make 50 grammes of emplastrum cantharidis.

Spread a blister for the right ear with the plaster made.

Ferri ammon. cit. . . ʒj.
 Potassii bicarb. . . . ʒij.
 Glycerini ʒiv.
 Aquam ad ʒiv.

Fiat mist.

Zinci oxidi ʒiv.
 Calaminæ ʒj.
 Glycerini ʒss.
 Aq. rosæ ad ʒiv.

Fiat lotio.

Phosphori gr. $\frac{1}{80}$
 Quininæ sulph. . . . gr. j.
 Strychninæ gr. $\frac{1}{25}$
 Fiat pilula. Mitte xxv. Silver.

LIII.

Ext. filicis liq. . . . ʒij.
 Pulv. acaciæ q.s.
 Aq. menth. pip. . . . ad ʒiiss.
 M. Ft. haustus.
 Sig. : Modo dictu sumendum.

Liq. Fowleri Oss.

Liq. amm. citratis Oss.

Make the above solutions and fill two 6-oz. bottles, and use the remainder for dispensing the mixture.

Menthol. . . . gr. ss.
 Creosoti ʒj.
 Bism. carb. . . . gr. ij.
 Pulv. opii gr. ss.
 M. Ft. pilula sec. artem. Varnish. Mitte tales xij.
 Sig. : Una quatuor horæ sum.

Potassii iodidi . . . ʒj.
 Liq. arsenicalis . . . ʒj.
 Liq. amm. citratis . . ʒiij.
 Spt. ætheris nitrosi . ʒss.
 Inf. quassiæ . . . ad ʒvj.
 M. Ft. mistura sec. artem.
 Sig. : ʒss. ter in die sumendum.

LIV.

Liq. plumbi subacet. fort. ʒiv.

Send ʒiv. of HgCl_2 in glycerin
 1 in 500, weight in weight.

Zinci oxidi . . . ʒiiss.
 Acid. salicyl. . . . gr. xxx.
 Paraff. moll. . . . ad ʒiiss.
 M.d.u.

Ol. olivæ . . . ʒj.
 Acid. oleic. . . . ʒxxiv.
 Muc. acaciæ . . . q.s.
 Aq. laurocerasi . . . ʒlxxx.
 Aq. . . . ad ʒviiij.
 ʒj. t.i.d.

Acid. arsenios. . . 1 milligram.
 Pulv. piper. nig. . . $\frac{1}{2}$ decigram.
 Glycyrrhizæ . . . 1 decigram.
 Ft. pil. Varnish. Mitte xxiv.
 Sig. : j. t.d. p.c.

LV.

Balsam. copaibæ . . ʒxx.
 Spt. æth. nit. . . ʒxxx.
 Spt. chloroformi . . ʒxxx.
 Pulv. acaciæ . . . q.s.
 Aq. . . . ad ʒss.
 Mitte ʒvj. ʒss. t.d.s.

Syr. ferri phosph. . ʒvj.
 ʒj. t.d.s.

Potass. chlor. . . ʒij.
 Inf. rosæ acid. . . ad ʒvj.
 Ft. garg.

Supp. plumbi co. Mitte vj.

Emp. plumbi,
 Paraff. mollis . . aa. ʒj.
 Ft. ung.

LVI.

Send 12 iron pills containing $\frac{1}{30}$ grain
 strych. hydroch. and $\frac{1}{30}$ grain ac.
 arsenios. Varnish.

Sodii sulphocarb. . . gr. vj.
 Sodii sulph. . . ʒss.
 Spt. chlorof. . . ʒss.
 Inf. gent. co. . . ad ʒss.
 Mitte ʒvj. ʒss. t.d.s.

Send a breast plaster of emp. plumbi
6 in. in diameter.

Morph. hydroch. . 0·1 per cent.

Atrop. sulph. . 0·01 per cent.

Aq. laurocerasi ad 20 c.c.

Sig. : The hypodermic solution.

LVII.

Make 100 c.c. liq. plumbi fort.

Sod. salicyl. . . ʒiss.

Tinct. quininæ . . ʒvj.

Ol. cinnam. . . ʒxij.

Aq. chlorof. . ad ʒvj.

Sig. : ʒj. o. 4 horis.

Ext. cannab. indic. . 10 milligrms.

Pot. brom. . . 5 decigrms.

Sodii brom. . . 5 decigrms.

Ft. pulv. Mitte vj.

The powders. One every four
hours as directed.

Atropinæ . . . 1·0

Cocain. . . . 1·0

Paraff. moll. . . 97·0

M. Ft. ung. Mitte ʒij.

For the eyes.

Ext. aloes . . . gr. $\frac{1}{2}$

Ext. cascara . . . gr. ij.

Pepsin. . . . gr. ij.

Ft. pil. ij. Mitte xxiv. Varnish.

LVIII.

Make ʒiv. of liq. arsenicalis.

Ac. salicyl. . . . 12

Ext. cannab. ind. . . 2

Collod. flexile ($\frac{3}{4}$ st.) ad 100

Ft. pigmentum. Mitte ʒj.

Quininæ sulph. . . gr. xxiv.

Acid. hydrochlor. dil. . ʒiss.

Potassii chlor. . . ʒiss.

Aq. chlorof. . ad ʒvj.

M. Ft. mist.

Sig. : ʒss. t.d.s. p.c.

Pepsini,

Pulv. rhei . . . aa. gr. ij.

Ft. pil. Mitte xij. Varnish.

Sig. : j. bis die p.c.

Ext. hamamel. liq. . ʒxv.

Ichthyol. amm. . . ʒxv.

Suppos. glycerini ad ʒij.

Ft. pessus. Mitte vj.

LIX.

3 grains atropine sulphate. Make
official liquor.

Plumbi acet. . . gr. j.

Ext. bellad. vir. . . gr. ss.

Ext. opii . . . gr. ss.

Ol. theobrom. . . q.s.

Make 6 such suppositories.

Ol. ricini . . . ʒxv.

Salol. . . . gr. ij.

Spt. chlorof. . . ʒss.

Mucil. acaciæ . . ʒxv.

Ft. xxiv. doses. ʒj. ter in die.

Liq. ext. ergotæ . . ʒiss.

Acid. carbol. . . gr. xx.

P. zinci ox. . . ʒj.

Adip. lanæ . . ad ʒj.

'The ointment.'

Pulv. cinnam. co. . ʒj.

Bismuth. carb. . ʒij.

Magnes. carb. pond. . ʒij.

Sod. bicarb. . . ʒij.

Pulv. rhei . . . gr. xx.

Ol. menth. pip. . ʒviiij.

Misce. ʒss. pro dosis.

LX.		Ac. tannic. . . . gr. xvj.
Syr. ferri phos. cum quin. et		Tr. myrrh. . . . mxxv.
strych. ξ iv.		Aq. . . . ad ξ j.
Butyl chloral. hyd. . . gr. ij.		Ft. garg. Mitte ξ viiij. Sæpe
Ft. pil. Mitte xx. Pone in phialâ.		utend.
Sig. : j. secundâ horâ sumend.		Ext. nucis vom. . . . gr. $\frac{1}{3}$
urgente dolore.		P. rhei gr. ij.
Menthol. 1 per cent.		Mag. carb. gr. x.
Camphor. 2 per cent.		M. Pone in cachet. ij. Mitte
Paraff. liq. ad ξ j.		tales x.
Ft. neb.		Sig. : ij. ter die sumend. inter
		cibos.

INCE'S DISPENSING APHORISMS.

Read through a prescription, rapidly and in a manner suggesting no suspicion of doubt.

Write directions invariably before dispensing.

Avoid thus the use of blotting-paper : a good dispenser uses almost none.

If a mixture contains readily soluble ingredients, never use a mortar.

Avoid effecting solution by heat, for fear of recrystallisation.

With syrups and also ingredients not water, arrange in dispensing to rinse out the measure and leave it clean.

A skilled dispenser shows very little traces of his work.

Learn to judge of the quantity to be weighed with tolerable accuracy : train the eye as well as the hand.

Carefully clean and put away weights and scales after each operation. [To those who use hand-scales.—ED.]

If in doubt, always begin with that of which you have no doubt.

Be rapid in manipulation.

Finish wrapping, tying, or sealing quickly.

Slow dispensing is bad dispensing, and arises either from deficient practice or want of knowledge.

Never, when in a shadow of doubt, hesitate to ask advice from a fear of compromising your own dignity.

APPENDIX.

ABBREVIATIONS USED IN
PRESCRIPTIONS.

THIS is a dictionary comprising chiefly the Latin abbreviations used in prescriptions written by British medical practitioners. Some of them are old, and a few almost archaic ; for example, *fist. arm.*, which denotes a clyster pipe and pig's bladder fitted for the administration of an enema before indiarubber bulb enema syringes were introduced. Such archaic abbreviations do not occupy much space, and they are of interest now and then. When a variety of meanings may be given to one abbreviation, all are brought together, and the reader must judge from the nature of the prescription which is implied.

A., (1) *aa*, *ana*, of each ingredient ;
(2) *ab*, *absque*, of or from ; (3)
adde, add thou ; (4) *ante*, before ;
(5) *alternus*, alternate ; (6) *aqua*,
water ; (7) *artem*, *secundum*
artem, according to art ; (8)
asinæ, *lac asinæ*, ass's milk.

A.H., *alternis horis*, every other
hour.

A.J., *ante jentaculum*, fasting, or
before breakfast.

A.P., *ante prandium*, before dinner.

Ab hinc, from this time.

Abdom., *abdomen*, the abdomen,
the belly.

Abs. febr., *absente febre*, fever being
absent.

Acid. hydroc., (1) *acidum hydro-*
chloricum ; (2) *acidum hydro-*
cyanicum.

Aconit., (1) *aconitum*, the plant ;
(2) *aconitina*, aconitine.

Ad 2 vic., *ad secundam vicem*,
vel ad duas vices, for two
times.

Ad 3tiam vicem, *ad tertiam vicem*,
for three times.

Ad alv. exc., *ad alvum excitandum*,
to stimulate the bowels.

Ad aur., *ad aurem*, to the ear.

Ad def. animi, *ad defectionem*
animi, to fainting.

Ad del. animi, *ad deliquium*
animi, to fainting.

Ad gr. acid., *ad gratam aciditatem*, to an agreeable acidity.

Ad libit., *ad libitum*, at pleasure.

Ad neutral., *ad neutralisandum*, to neutralisation.

Ad recid. præc., *ad recidivum præcavendum*, to prevent a relapse.

Ad sat., *ad saturandum*, to saturation.

Add., (1) *adde*, add thou; (2) *addantur*, let them be added; (3) *addendus*, to be added; (4) *addendo*, by adding.

Adeps S., *adeps suillus*, hog's lard.

Adjac., *adjacens*, adjacent.

Admov., (1) *admove*, apply; (2) *admoveatur*, let it be applied; (3) *admoveantur*, let them be applied.

Ads. febre, *adstante febre*, while the fever is present.

Adv., *adversum*, against.

Æg., *æger* vel *ægra*, the patient; *æger sumat*, let the patient take.

Æq., (1) *æqualis*, equal; (2) *æqualiter*, equally; (3) *æquabilis*, uniform.

Aggred. febre, *aggrediente febre*, while the fever is coming on.

Alt., *altera*, the other or remainder.

Alter. (altern.) *horis*, *alternis horis*, every other hour.

Alvo adst., *alvo adstrictâ*, when the bowels are confined.

A.M., *ante meridiem*, before noon-day.

Ammon., (1) *ammonia*; (2) *ammoniacum*.

Ante cœn., *ante cœnam*, before supper; *a. jentaculum*, before breakfast; *a. prandium*, before dinner.

Applic., (1) *applicandus*, to be applied; (2) *applicetur*, let it be applied; (3) *applicentur*, let them be applied.

Aq., *aqua*, water.

Aq. astr., *aqua astricta*, frozen water.

Aq. bull., *aqua bulliens*, boiling water.

Aq. cal., *aqua calida*, hot water.

Aq. chlor., (1) *aqua chloroformi* (generally), chloroform water; (2) *aqua chlori* (rarely), chlorine water.

Aq. com., *aqua communis*, common water.

Aq. dest., *aqua destillata*, distilled water.

Aq. ferv., *aqua fervens*, warm, or hot, water.

Aq. fluv., *aqua fluvialis*, river water.

Aq. font., *aqua fontana*, vel *fontis*, vel *fontalis*, spring water. (Has been misread, *aqua fortis*.)

Aq. gel., *aqua gelida*, cold water.

Aq. mar., *aqua marina*, sea water.

Aq. niv., *aqua nivalis*, snow water.

Aq. pluv., *aqua pluviatilis*, seu *pluvialis*, rain water.

Aq. pur., *aqua pura*, natural pure water.

Aur., *auris*, the ear; *auri dextra* vel *levæ*, to right or left ear; *ad aurem*, to the ear; p. aur., *pone aurem*, behind the ear.

Aur. prim., *aurora prima*, early in the morning.

B., (1) *balsamum*, a balsam; (2) *balneum*, a bath; (3) *bene*, well; (4) *bis*, twice; (5) *bolus*, bolus, a large pill; (6) *bovis* (lac b., lac

- bovis*, cow's milk); (7) *brachium*, the arm (mitt. sang. b., *mittatur sanguis brachio*, let blood be taken from the arm); (8) *bulliens*, boiling.
- Bb., bbds., *barbadensis*, Barbadoes.
- B.M., *balneum marinum*, seu *maris*, a sea or salt water bath.
- B.P., B.Ph., British Pharmacopœia.
- B.P.C., British Pharmaceutical Conference or British Pharmaceutical Codex.
- B.T., *balneum tepidum*, a warm bath.
- B.V., *balneum vaporis*, *vaporosum*, a vapour bath.
- Bals., *balsamum*, balsam.
- Bib., *bibe*, drink thou.
- Bic., *bicarbonas*, bicarbonate.
- Bis d., *bis die*; bis d.d., *bis de die*, twice a day.
- Bis ind., *bis indies*, twice a day.
- Bov., (1) *bovis*, of an ox; (2) *bovillus*, (3) *bovinus*, pertaining to an ox or cow.
- Brach., *brachium*, the arm.
- Bull., (1) *bulliens*, boiling; (2) *bulliat* or *bulliant*, let boil.
- But., *butyrum*, butter.
- C. (1) *lac c.*, *lac capellæ*, *lac capræ*, goat's milk; (2) *c. radat.*, *caput radatur*, let the head be shaved; (3) *p.c. post cœnam*, after supper, *pondus civile*, avoirdupois weight; (4) *colatus*, strained; (5) *coletur*, let it be strained; (6) *compositus*, compound; (7) *concisus*, cut; (8) *confectio*, a confection; (9) *congius*, a gallon; (10) *conserva*, a conserve; (11) *continue*, continue thou; (12) *con-*
- trit*us, bruised, broken small; (13) *contusus*, bruised, pounded; (14) *cortex*, bark; (15) *cras*, *crastinus*, of to-morrow; (16) *crySTALLIS*, in crystals; (17) *cujus*, of which; (18) *cum*, with; (19) *cyathus*, a glass, pot, or cup.
- C.C., (1) *cucurbitula cruenta*, a cupping-glass with a scarificator; (2) *cornu cervi*, hartshorn.
- C.C.U., *cornu cervi ustum*, burnt hartshorn.
- C.M.S., *cras mane sumendus*, to be taken to-morrow morning.
- C.N., *cras nocte*, to-morrow night.
- C.V., *cras vespere*, to-morrow evening.
- C. vin., *cyathus vinarius* vel *vinosus*, a wineglass.
- Cærul., *cæruleus*, blue.
- Cal., *calidus*, warm.
- Cal., calom., *calomelas*, calomel.
- Cal. chlor., (1) *calcii chloridum*, calcium chloride; (2) *calx chlorinata*, chlorinated lime.
- Cap., *capiat*, let (the patient) take.
- Caput r., *caput radatur*, let the head be shaved.
- Chart., *charta* vel *chartula*, a paper (a powder in paper).
- Co., *compositus*, compound.
- Coch., *cochleare*, spoonful.
- Coch. ampl., *cochleare amplum*, a large (table) spoonful; about 4 fl. drachms.
- Coch. inf., *cochleare infantis*, a child's spoonful, about 1 fl. drachm.
- Coch. mag., *cochleare magnum*, a large or table spoonful, about 4 fluid drachms.
- Coch. med. vel mod., *cochleare medium* vel *modicum*, a middling

- (dessert) spoonful, about 2 fl. drachms.
- Coch. min. *vel parv.*, *cochleare minimum vel parvum*, a small (tea) spoonful; about 1 fl. drachm.
- Cochleat., *cochleatim*, by spoonfuls.
- Cod. med., *Codex Medicamentarius*, French Codex or Pharmacopœia.
- Col., (1) *cola*, strain; (2) *colatus*, strained.
- Colat., (1) *colatus*, strained; (2) *colaturæ*, to the strained liquor.
- Colet., *coletur*, let it be strained.
- Colent., *colentur*, let them be strained.
- Coll., (1) *collutorium*, a mouth-wash; (2) *collyrium*, an eye-lotion.
- Color., *coloretur*, let it be coloured.
- Comp., (1) *compositus*, compound; (2) *comprimo*, to press; (3) *compressus*, compressed.
- Con., *concisus*, cut, sliced.
- Conc., (1) *concentratus*, concentrated; (2) *concisus*, cut.
- Cong., *congius*, a gallon.
- Cons., *conserva*, (1) a conserve; (2) keep thou.
- Cont., (1) *contusus*, bruised; (2) *contritus*, pounded.
- Cont. rem. seu med., *continuentur remedia seu medicamenta*, let the medicines be continued.
- Coq., (1) *coque*, boil; (2) *coquantur*, let them be boiled.
- Coq. ad med. consumpt., *coque seu coquatur ad medietatis consumptionem*, boil, or let it be boiled, till half is consumed.
- Coq. s. a., *coque secundum artem*, boil according to art.
- Coque in s. a., *coque in sufficiente quantitate aquæ*, boil in a sufficient quantity of water.
- Cort., *cortex*, bark.
- Crast., *crastinus*, of to-morrow.
- Cuj., *cujus*, of which.
- Cujusl., *cujuslibet*, of any.
- Cy. *vel cyath.* theæ, *cyatho theæ*, in a cup of tea.
- Cy. vinar., *cyathus vinarius*, a wine-glass.
- Cyath., *cyathus*, *vel c. vinar.*, *c. vinarius*, a wineglass; about 2 fluid ounces, or in France about 5 fluid ounces.
- D., (1) d. sp., *debita spissitudo*, a proper consistence; (2) *detur*, let it be given; (3) *dexter*, the right side; (4) *dies*, a day; (5) *dilutus*, diluted; (6) *dimidius*, the half; (7) *directio*, a direction; (8) *divide*, *dividatur*, divide thou, let it be divided; (9) *donec*, until; (10) *dosis*, a dose; (11) *dum*, until; (12) *duplex*, double; (13) *durans*, during; (14) *duratus*, dried.
- D. in 2plo, *detur in duplo*, let twice as much be given.
- D. in p. æq., *dividatur in partes æquales*, let it be divided into equal parts.
- D.D., *detur ad*, let it be given up to.
- D.P., *directione propriâ*, with a proper direction.
- D.S., (1) *dona*, *signa*, give and sign; (2) *detur*, *signetur*, let it be given and signed (*i.e.*, directed).
- D. seq., *die sequente*, on the following day.
- D. spiss., *debita spissitudo*, a proper consistence.
- De d. in d., *de die in diem*, from day to day.

Deaur. pil., *deaurantur pilulæ*, let the pills be gilded.
 Deb. spiss., *see* D. spiss.
 Dec., (1) *decanta*, pour off; (2) *decimus*, tenth; (3) *decoctum*, a decoction.
 Decub., *decubitûs*, of lying down.
 Decub. hor., *decubitûs horâ*, at the hour of going to bed, at bedtime.
 Deglut., *deglutiat*, let it be swallowed.
 Dej. alvi, *dejectiones alvi*, motions of the bowels.
 Dest., *destillatus*, distilled.
 Det., *detur*, let it be given.
 Dext. lat., *dextrum latus*, the right side.
 Dieb. alt., *diebus alternis*, every other day.
 Dieb. tert., *diebus tertiis*, every third day.
 Dil., (1) *dilue*, dilute thou; (2) *dilutus*, diluted.
 Diluc., *diluculo*, at break of day.
 Dim., *dimidius*, half.
 Donec alv. bis dej., *donec alvus bis dejiciatur*, until the bowels have been twice moved.
 Donec alv. sol. fuer., *donec alvus soluta fuerit*, until the bowels be moved.
 Donec dol. neph. exulav., *donec dolor nephriticus exulaverit*, until the nephritic pain is relieved.
 E., (1) *electus*, picked or selected; (2) *electuarium*, an electuary; (3) *emeticum*, an emetic; (4) *emplastrum*, a plaster; (5) *eos*, the morning; (6) *extractum*, an extract; (also as a preposition—of, out of, in).
 E paul. aq., *e paullo aquæ*, in a little water.

Eburn., *eburneus*, made of ivory.
 Ed., *edulcoratus*, edulcorated, clarified.
 Ejusd., *ejusdem*, of the same.
 Elect., *electuarium*, an electuary.
 Em., (1) *embrocatio*, an embrocation; (2) *emplastrum* (q.v.); (3) *emulsio* (q.v.).
 Emp., *emplastrum*, a plaster.
 Emp. lyth., *emplastrum lythargyri*. (Has been misread, *emplastrum lyttæ*.)
 Emuls., *emulsio* (U.S.P., *emulsum*), an emulsion.
 Enem., *enema*, an enema, a clyster.
 Esur., *esuriens*, fasting or before food.
 Ex aq., *ex aquâ*, in water.
 Ex gel. vit., *ex gelatinâ vituli*, in calf's-foot jelly.
 Exhib., *exhibeatur*, let it be exhibited.
 Exsic., (1) *exsicco*, to dry thoroughly; (2) *exsiccatus*, well dried.
 Ext., (1) *extractum*, an extract; (2) *extemplo*, immediately; (3) *extende*, spread; (4) *extus*, externally.
 Ext. col., (1) *extractum colchici*; (2) *extractum colocynthidis*.
 Ext. col. co., *extractum colocynthidis compositum*.
 Ext. sup. alut. moll., *extende super alutam mollem*, spread it upon soft leather.
 F., (1) *fac*, make thou; (2) *fiat*, *fiant*, let it (them) be made; (3) *fervens*, boiling; (4) *folium*, a leaf; (5) *forma*, form, shape; (6) *fortis*, strong; (7) *folus*, a fomentation; (8) *fuscus*, brown.
 F.A.O., *folio argenti obscurando*, cover in silver leaf.

- F.H., *fiat haustus*, let a draught be made.
- F.L.A., *fiat lege artis*, let it be made by the rules of art.
- F.M., *fiat mistura*, let a mixture be made.
- F.S.A., *fiat secundum artem*, let it be made according to art.
- F. pil., (1) *fac pilulas*, make pills; (2) *fiat pilula*, vel *fiant pilulæ*, let a pill or pills be made.
- F. venæs., *fiat venæsectio*, bleed.
- Fasc., *fasciculus*, a bundle which can be carried under the arm; about 4 oz. *Linnaeus*, 1 oz. *Geiger*.
- Feb. dur., *febre durante*, during the fever.
- Fem. intern., *femoribus internis*, to the inner part of the thighs.
- Fict., *fictilis*, earthen.
- Fil., *filtrum*, a filter.
- Fist. arm., *fistula armata*, a clyster pipe and bladder fitted for use.
- Fl., (1) *flatus*, flatulence; (2) *flavus*, yellow; (3) *flos*, a flower; (4) *fluidus*, fluid, or by measure; (5) *fluviatilis*, aq. fl., river water.
- Fol., *folium*, leaf.
- Frig., *frigidus*, cold.
- Frust., *frustillatim*, in little pieces, little by little.
- Ft., *fiat, fiant*, let it (them) be made.
- Fus., (1) *fuscus*, brown; (2) *fusus*, fused.
- G., (1) *gallicus*, French; (2) *gelatina*, jelly; (3) *gelida*, aq. gel., cold water; (4) *granum*, a grain; (5) *gummi*, a gum; (6) *gutta*, a drop; (7) gram (in foreign prescriptions).
- G.G.G., *gummi guttæ gambiæ*, gamboge.
- Garg., *gargarisma*, a gargle.
- Gel., *gelatum* vel *gelatinum* (U.S.P.), a jelly made with glycerin and gelatin or other solidifying agent.
- Gel. quav., *gelatinâ quavis*, in any kind of jelly.
- Gr., *granum*, a grain.
- Gr. vj. pond., *grana sex pondere*, six grains by weight.
- Grm., *gramma*, a gramme; *grms.*, grammes.
- Gtt., *gutta*, a drop; *guttæ*, drops.
- Gutt. quibusd., *guttis quibusdam*, with a few drops.
- Guttat., *guttatim*, by drops.
- H., (1) *habeat*, he may have, let him have; (2) *harum*, vel *horum*, of these; (3) *haustus*, a draught; (4) *herba*, a herb; (5) *hic*, this; (6) *hora*, an hour; (7) *hujus*, of this.
- H.d., *horâ decubitûs*, at bedtime, at the hour of going to bed.
- H.f., *hujus formæ*, of this shape.
- H.p.n., *haustus purgans noster*, our own purging draught.
- H.s., *horâ somni*, at the hour of sleep.
- Hab., *habeat*, let him have or take.
- Har. pil. sum. iij., *harum pilularum sumantur tres*, let three of these pills be taken.
- Haust., *haustus*, the draught.
- Hb., *herba*, a herb.
- Hebd., *hebdomas*, a week; *hebdomada*, for a week.
- Hor. iima mat., *horâ undecimâ matutinâ*, at 11 A.M., at the eleventh hour in the morning.
- Hor. interm., *horis intermediis*, in the intermediate hours.
- Hor. un. spat., *horæ unius spatio*, at the expiration of an hour.

- Ht. t.d.d.s., *haustus ter de die sumendus*, the draught to be taken three times a day.
- Hydr., (1) *hydrargyrum*, mercury; (2) *hydras*, hydrate; (3) *hydriodas*, iodide; (4) *hydrochloricum*, hydrochloric; (5) *hydrocyanicum*, hydrocyanic.
- Hydr. bic., (1) *hydrargyri bichloridum*, corrosive sublimate; (2) *hydrargyri bicianidum*, bicianide of mercury.
- Hydr. bin., (1) *hydrargyri biniodidum*, biniodide of mercury; (2) *hydrargyri binoxidum*, red oxide of mercury.
- Hyd. chlor., (1) *hydrargyri chloridum*, calomel; (2) *hydras chloral*, chloral hydrate.
- Hydr. ox. n., (1) *hydrargyri oxidum nigrum*, black oxide of mercury; (2) *hydrargyri oxidum nitricum*, red oxide of mercury.
- Hyos., (1) *hyoscyamus*, henbane; (2) *hyoscina*, hyoscine; (3) *hyoscyamina*, hyoscyamine.
- Ichth., (1) *ichthyol*; (2) *ichthyocolla*, isinglass.
- Id., *idem*, the same; *ejusdem*, of the same (e.g., *tr. senegæ*, *inf. ejusdem*, tincture of senega and infusion of senega).
- Imp., *impurus*, impure.
- Impet. efferv., *impetu effervescentiæ*, during effervescence.
- Impr., (1) *impransus*, fasting; (2) *imprimis*, in the first place; (3) *impromptu*, directly.
- In pulm., *in pulmento*, in gruel.
- Inc., (1) *incide*, cut thou; (2) *incisus*, cut, sliced.
- Ind., *indies*, from day to day, daily.
- Inf., (1) *infunde*, pour in; (2) *infricare*, to rub in; (3) *infusum*, an infusion.
- Infund., *infundibulum*, a funnel.
- Inj. enem., *injiciatur enema*, let an enema or clyster be (thrown up) administered.
- J., *jentaculum*, breakfast.
- Jec., *jecus*, the liver (e.g., *ol. jec. as.*, cod-liver oil).
- Jul., *julepus*, *julepum*, *julapium*, a julep.
- Kal. ppt., *kali præparatum*, prepared kali, potassium carbonate.
- L., (1) *lac*, milk; (2) *lapis*, a stone; (3) *latus*, a side; (4) *lege*, (1) read thou, (2) by law; (5) *libra*, a pound, also a pair of scales; (6) *lignum*, wood; (7) *linimentum*, a liniment; (8) *liquor*, a liquor or liquid; (9) *lotio*, a lotion.
- Lac A., *lac asinarum*, ass's milk.
- Lac B., *lac bovis*, cow's milk.
- Lac C., *lac capræ seu capellæ*, goat's milk.
- Lac O., *lac ovillum seu ovinum*, ewe's milk.
- Lac V., *lac vaccæ*, cow's milk.
- Lat. dol., *lateri dolenti*, to the painful or affected side.
- Len., *lenis*, gentle.
- Lig., (1) *lignum*, wood; (2) *ligamentum*, bandage.
- Liq., (1) *liquidus*, a liquid; (2) *liquor*, a solution.
- M., (1) *mane*, the morning; (2) *manipulus*, a handful; (3) *marina*, marine, belonging to the sea; (4) b.m., *balneum maris*, a sea-water bath; (5) *massa*, a mass; (6) *mensurâ*, by measure; (7) m. pan., *mica panis*, crumb

- of bread ; (8) *minimum*, a minim ; (9) *misce*, mix thou ; (10) *mistura*, a mixture ; (11) *mitte*, send.
- M.B., *misce bene*, mix well.
- M.D.S., *misce, dona, signa*, mix, give, and direct ; usually in German prescriptions and means 'make a mixture.'
- M.D.U., *more dicto utend.*, to be used as directed.
- M. dict., *more dicto*, in the way directed.
- M. et v., *mane et vespere*, morning and evening.
- M.P., *massa pilularum*, a pill mass.
- M. pan., *mica panis*, crumb of bread.
- Man., *manipulus*, a handful.
- Mane pr., *mane primo*, very early in the morning.
- Mass., *massa*, a mass (*e.g.*, of pill).
- Menth. p., *mentha piperita*, peppermint. Seldom *mentha pulegium*, pennyroyal.
- Mic. pan., *mica panis*, crumb of bread.
- Min., (1) *minimum*, a minim ; (2) *minutum*, a minute.
- Mist., *mistura*, a mixture.
- Mitt., (1) *mitte*, send ; (2) *mittatur, mittantur*, let it, let them, be sent.
- Mitt. sang. ad ℥xij. saltem, *mitte sanguinem ad uncias duodecim saltem*, take blood to 12 ounces at least.
- Mod. præsc., *modo præscripto*, in the manner prescribed.
- Mor. dict., *more dicto*, in the manner directed.
- Mor. sol., *more solito*, in the usual manner.
- N., (1) *natura*, nature ; (2) *niger*, black ; (3) *nocte*, at night ; (4) *nomen*, name ; (5) *non*, not ; (6) *novus*, new ; (7) *nucha, nucha capitis*, the nape of the neck ; (8) *numero*, in number ; (9) *nux*, a nut.
- N. capit., *nucha capitis*, the nape of the neck.
- N.M. *nux moschata*, nutmeg.
- Ne tr. s. num., *ne tradas sine nummo*, do not deliver unless paid.
- Ng., *niger*, black.
- No., *numero*, in number.
- O., (1) *octarius*, a pint ; (2) *oleum*, oil ; (3) *omnis*, all ; (4) *optimus*, the best ; (5) *ovillum* and *ovium*, sheep's, belonging to sheep ; (6) *ovum*, an egg.
- O. alt. hor., *omnibus alternis horis*, every alternate hour.
- O.f., *olla fictilis*, an earthenware jar.
- O.M., *omni mane*, every morning.
- O.N., *omni nocte*, every night.
- O.O.O., *oleum olivæ optimum*, best olive oil.
- Ocul., *oculus*, the eye.
- Ol. lini s. i., *oleum lini sine igne*, cold-drawn linseed oil.
- Omn. bid., *omni biduo*, every two days.
- Omn. bih., *omni bihorio*, every two hours.
- Omn. hor., *omni horâ*, every hour.
- Omn. man., *omni mane*, every morning.
- Omn. noct., *omni nocte*, every night.
- Omn. quadr. hor., *omni quadrante horæ*, every quarter of an hour.
- Op., *ope*, by means of.
- Opt., *optimus*, best.
- Ov., *ovum*, an egg.
- Ov. vit. sol., *ovi vitello solutum*,

- dissolved (emulsified or mixed) in the yolk of an egg.
- Oz., the ounce avoirdupois, as distinguished from the troy or apothecaries' ounce (written $\bar{3}$).
- P., (1) *pars*, a part; (2) *parvus*, small; (3) *per*, by; (4) *pilula*, a pill; (5) *pilus*, hair; (6) *pondere*, by weight; (7) *pondus*, weight; (8) *præparatus*, prepared; (9) *prandium*, dinner; (10) *pro*, for; (11) *proprius*, proper; (12) *pulvis*, a powder.
- P., *Pharmacopœia*. See Ph.B., &c.
- P.a.a., *parti affectæ applicandus*, to be applied to the affected part.
- P. æ., *partes æquales*, equal parts.
- P. aur., *pone aurem*, behind the ear.
- P.c., (1) *post cibos*, after meals; (2) *post cœnam*, after supper; (3) *percentum*; (4) *pondus civile*, civil weight, avoirdupois weight.
- P. chart., *pyxis chartacea*, a powder-box.
- P.d., (1) *per deliquium*, by deliquescence; (2) *pro dosi*, for a dose.
- P. derad., *pilus deradatur*, let the hair be shaved off.
- P.m., (1) *pondus medicinale*, medicinal weight, apothecaries' weight; (2) *post meridiem*, the afternoon.
- P.P., (1) *partes*, parts; (2) *pulvis patrum*, cinchona in powder.
- P.p.a., *phiala prius agitata*, first shake the bottle.
- P.r.n., *pro re natâ*, occasionally.
- P. rat. æt., *pro ratione ætatis*, according to the age of the patient.
- Part. aff., *partem affectam*, the part affected.
- Part. dolen., *partem dolentem*, the part in pain.
- Part. vic., *partitis vicibus*, in divided doses.
- Past., (1) *pasta*, paste; (2) *pastillus*, a lozenge, pastille.
- Pect., *pectus*, the breast, chest.
- Per bid. trid., *per bidduum triduum*, for two or three days.
- Per. op. emet., *peractâ operatione emetici*, when the operation of the emetic is finished.
- Per salt., *per saltum*, by leaps (speaking of blood from an artery).
- Ph. B., *Pharmacopœia Britannica*, British Pharmacopœia.
- Ph. Bor., *Pharmacopœia Borussica*, Prussian Pharmacopœia, superseded by Ph.G., German Pharmacopœia or *Arzneibuch* (medicine book).
- Ph. D., *Pharmacopœia Dublinensis*, Dublin Pharmacopœia.
- Ph. E., *Pharmacopœia Edinensis*, Edinburgh Pharmacopœia.
- Ph. Gal. *Pharmacopœia Gallica*, French Pharmacopœia. *The Codex* (see Codex).
- Ph. L., *Pharmacopœia Londinensis*, London Pharmacopœia.
- Ph. U.S., United States Pharmacopœia.
- Phial., *phiala*, a phial or bottle.
- Plen. riv., *pleno rivo*, in a full stream.
- Pocil., *pocillum*, a little cup.
- Pocul., *poculum*, a cup; a teacup holds 4 to 6 fluid ounces.
- Post prand., *post prandium*, after dinner.
- Post sing. sed. liq., *post singulas sedes liquidas*, after every liquid stool.
- Pot. hydr., *potassæ hydriodas*,

- hydriodate (iodide) of potash.
The abbreviation may now stand in many cases for *potassæ hydras*.
Ppt., *præcipitatus*, precipitated, or *præparatus* (q.v.).
Pr., mane pr., *mane primo*, very early in the morning.
Præp., *præparatus*, prepared.
Prand., *prandium*, dinner.
Pro pot. com., *pro potu communi*, for a common drink.
Pro pot. sum., *pro potu sumendus*, to be taken as a drink.
Pro us. ex., *pro uso externo*, for external use.
Prox. luc., *proximâ luce*, on the next day.
Pug., *pugillus*, a pinch.
Pulv., (1) *pulvis*, a powder; (2) *pulverisatus*, powdered.
Pv., *parvus*, small.
Q., (1) *quantum* as much; (2) *quisque, quaque*, etc., everyone; (3) *quarum, vel quorum*, of which; (4) *quaterve*, or four times; (5) *quatuor*, four; (6) *qui*, who, which.
Q.c., *quantum convenit*, as much as is convenient.
Q.c.c.p., *quantum cuspidè cultri potest*, as much as can be taken on the point of a knife.
Q.dx., *quantitas duplex*, double quantity.
Q.j., *quantum juvat*, as much as is agreeable.
Q.l., *quantum libet*, as much as you please.
Q.p., *quantum placet*, as much as you please.
Q.Q., *quaque*, every.
Q.q.h., *quâque quartâ horâ*, every four hours.
Q.s., *quantum satis seu sufficiat*, as much as is sufficient.
Q.s.e., (1) *quantum satis est*, as much as is sufficient; (2) *quantum sitis exigat*, as much as the thirst requires.
Q.v., (1) *quantum vis, vel volueris*, as much as you will; (2) *quod vide*, which see.
Quant., *quantitas*, quantity (e.g., *q. fabæ*, a piece the size of a bean, *q. nucis*, of a nut, etc.).
Quor., *quorum*, of which.
Quot. mane, *quolibet mane*, any morning.
R., (1) *radix*, a root; (2) p.r.n., *pro re natâ*, occasionally; (3) *recipe*, take thou; (4) *rectificatus*, rectified; (5) *redactus*, reduced or powdered; (6) *regio*, region, part.
R. in pulv., red. in pulv., *redactus in pulverem*, powdered.
Rad., *radix*, a root.
Ras., *rasuræ*, shavings.
Redig. in pulv., *redigatur in pulverem*, let it be reduced to powder.
Reg., *regioni*, to the region.
Reg. cor., *regio cordis*, region of the heart.
Reg. hep., *regio hepatis*, the region of the liver.
Reg. umbil., *regio umbilici*, the umbilical region.
Repet., *repetatur, repetantur*, let it (them) be repeated.
S., (1) *sal*, a salt; (2) *semina*, seeds; (3) *semi, semissis*, half; (4) *si*, if; (5) *simul*, together; (6) *sine*, without; (7) *sit, si opus sit*, if there be occasion; (8) *spiritus*, spirit; (9) *stratum*, a layer; (10) *succus*, juice; (11) *adeps s., adeps*

- suillus*, hog's lard ; (12) *sufficiens*, sufficient ; (13) *sumo*, *sumere*, to take ; (14) *super*, upon ; (15) *sympus*, syrup.
- S.a., *secundum artem*, according to art.
- S.G., specific gravity.
- S.N., *secundum naturam*, according to nature.
- S.o.s., *si opus sit*, if there be occasion.
- S.S., *semisse*, a half.
- S.S.S., *stratum super stratum*, layer upon layer.
- S.V., (1) *spiritus vini*, spirit of wine ; (2) *spiritus vinosus*, ardent spirits of any sort.
- S.V.M., *spiritus vini methylatus*, methylated spirit.
- S.V.R., *spiritus vini rectificatus*, rectified spirit.
- S.V.T., *spiritus vini tenuior*, proof spirit.
- Scat., *scatula*, a box
- Scrob. cord., *scrobiculus cordis*, the pit of the stomach.
- Semidr., *semidrachma*, half a drachm.
- Semih., *semihora*, half an hour.
- Seq. luce, *sequenti luce*, the following day.
- Serv., *serva*, keep.
- Sesquih., *sesquihora*, an hour and a half.
- Sesunc., *sesuncia*, an ounce and a half.
- Sev., (1) *sebum*, suet ; (2) *severus*, severe.
- Si n. val., *si non valeat*, if it does not answer.
- Si op. sit, *si opus sit*, if there be occasion.
- Si vir. perm., *si vires permittant*, if the strength permit.
- Sicc., *siccatus*, dried.
- Sig., *signa*, mark or direct—i.e., label it.
- Sig. n. pr., *signetur nomine proprio*, let it be labelled with the proper, and not the trade, name.
- Signat., *signatura*, a label.
- Sing., *singulorum*, of each.
- Sod. chlor., (1) *sodii chloridum* ; (2) *soda chlorata* or *chlorinata*, chlorinated soda.
- Sp., spt., *spiritus*, a spirit.
- Ss., *semi*, seu *semissis*, half.
- St., (1) *stet*, *stent*, let it (them) stand ; (2) *statim*, immediately.
- Stat. eff., *statu effervescentie*, during effervescence.
- Sol., (1) *soleo*, to be accustomed (e.g., *more solito* [q.v.]) ; (2) *solidus*, whole ; (3) *solubilis*, soluble ; (4) *solutio*, solution ; (5) *solutus*, dissolved ; (6) *solvo*, *solvere*, to dissolve.
- Stern., *sternum*, the breast-bone, chest.
- Sub fin. coct., *sub finem coctionis*, when the boiling is nearly finished.
- Subl., *sublimatus*, sublimed.
- Subtl., *subtilissimus*, very fine.
- Succ., *succus*, a juice.
- Sulph., (1) *sulphur* ; (2) *sulphas*, a sulphate ; (3) *sulphidum*, *sulphuretum*, a sulphide ; (4) *sulphis*, a sulphite ; (5) *sulphuricum*, sulphuric ; (6) *sulphurosum*, sulphurous. May also mean sulphonal or anything else in which the syllable is the first part of the word.
- Sum., (1) *summitates*, the summits or tops ; (2) *sume*, take thou ; (3) *sumat*, let him take ; (4)

- sumatur*, let it be taken ; (5) *sumantur*, let them be taken ; (6) *sumendus*, to be taken.
- Sum. tal., *sumat talem*, let the patient take one like this.
- Syr., *syrupus*, a syrup.
- T., (1) *talis*, such as, like this ; (2) *tenuis*, thin, weak ; (3) *tere*, rub thou ; (4) *tinctura*, a tincture.
- T.d.d., *ter de die*, thrice a day.
- T.O., *tinctura opii*, tincture of opium.
- T.O.C., *tinctura opii camphorata*, camphorated tincture of opium, paregoric elixir.
- T. s., *tere simul*, rub together.
- Tabel., *tabella*, a tablet.
- Temp. dext., *tempori dextro*, to the right temple.
- Ter. sim., *tere simul*, rub together.
- T.i.d., *ter in die*, thrice daily.
- Tr., Tra., *tinctura*, a tincture.
- Trit., *tritura*, triturate.
- Troch., *trochisci*, lozenges.
- Tuss., *tussis*, a cough.
- U.S.P., United States Pharmacopœia.
- Ult. præscrip., *ultimo præscriptus*, the last ordered.
- Usq. ut liq. anim., *usque ut liquerit animus*, until fainting is produced.
- V., (1) *venæ*, the veins ; (2) *vesper*, the evening ; (3) *vinum*, wine ; (4) *vis, quantum vis*, as much as you will ; (5) *vitellus*, yolk (of egg) ; (6) *vitulus*, a calf ; (7) *volueris, quantum volueris*, as much as you wish.
- V.O.S., *vitello ovi solutus*, dissolved in yolk of egg.
- Vic., *vices*, times.
- Vom. urg., *vomitione urgente*, the vomiting being troublesome.
- Vs., *venæsectio*, bleeding, venesection.
- Zz., *zingiber*, ginger.

OFFICIAL ABBREVIATIONS.

The British Pharmacopœia, 1914, introduced for the first time a list of abbreviations of the Latin titles of drugs and preparations therein. This has been done in the interest of international uniformity, and Professor J. P. Remington, Chairman of the United States Pharmacopœial Convention, has intimated to the General Medical Council that similar abbreviations are likely to be adopted in the Pharmacopœia of the United States of America. The list is given here for the use of dispensers, who, in cases of doubt, should be guided by these official abbreviations :—

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Acac. Cort.	Acaciæ Cortex	Acid. Acet. Glac.	Acidum Aceticum Glaciale
Acac. Gum.	Acaciæ Gummi	Acid. Acetylsal.	Acidum Acetylsalicylicum
Acet. Cantharidin.	Acetum Cantharidini	Acid. Arsen.	Acidum Arseniosum
Acet. Scill.	Acetum Scillæ	Acid. Benz.	Acidum Benzoicum
Acet. Urgin.	Acetum Urginæ	Acid. Bor.	Acidum Boricum
Acid. Acet.	Acidum Aceticum	Acid. Carbol.	Acidum Carbolicum
Acid. Acet. Dil.	Acidum Aceticum Dilutum		

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Acid. Carbol. Liq.	Acidum Carbolicum Liquefactum	Apomorph. Hydro- chl.	Apomorphinæ Hy- drochloridum
Acid. Chrom.	Acidum Chromicum	Aq. Aneth.	Aqua Anethi
Acid. Cit.	Acidum Citricum	Aq. Anis.	Aqua Anisi
Acid. Hydriod. Dil.	Acidum Hydriodi- cum Dilutum	Aq. Aurant. Flor.	Aqua Aurantii Floris
Acid. Hydrobrom. Dil.	Acidum Hydrobro- micum Dilutum	Aq. Camph.	Aqua Camphoræ
Acid. Hydrochl.	Acidum Hydrochlori- cum	Aq. Carui	Aqua Carui
Acid. Hydrochl. Dil.	Acidum Hydrochlori- cum Dilutum	Aq. Chlorof.	Aqua Chloroformi
Acid. Hydrocyan. Dil.	Acidum Hydrocyani- cum Dilutum	Aq. Cinnam.	Aqua Cinnamomi
Acid. Lact.	Acidum Lacticum	Aq. Dest.	Aqua Destillata
Acid. Nit.	Acidum Nitricum	Aq. Fœnic.	Aqua Fœniculi
Acid. Nit. Dil.	Acidum Nitricum Dilutum	Aq. Laurocer.	Aqua Laurocerasi
Acid. Nitro-hydro- chl. Dil.	Acidum Nitro-hydro- chloricum Dilutum	Aq. Menth. Pip.	Aqua Menthæ Piper- itæ
Acid. Oleic.	Acidum Oleicum	Aq. Menth. Vir.	Aqua Menthæ Viri- dis
Acid. Phosph. Conc.	Acidum Phosphori- cum Concentratum	Aq. Ros.	Aqua Rosæ
Acid. Phosph. Dil.	Acidum Phosphori- cum Dilutum	Ararob.	Araroba
Acid. Picr.	Acidum Picricum	Argent. Nit.	Argentii Nitras
Acid. Salicyl.	Acidum Salicylicum	Argent. Nit. Indur.	Argentii Nitras In- duratus
Acid. Sulph.	Acidum Sulphuricum	Argent. Nit. Mitig.	Argentii Nitras Miti- gatus
Acid. Sulph. Aromat.	Acidum Sulphuricum Aromaticum	Armor. Rad.	Armoraciæ Radix
Acid. Sulph. Dil.	Acidum Sulphuricum Dilutum	Arnic. Flor.	Arnicæ Flores
Acid. Sulphuros.	Acidum Sulphurosus	Arsen. Iod.	Arsenii Iodidum
Acid. Tann.	Acidum Tannicum	Asafet.	Asafetida
Acid. Tart.	Acidum Tartaricum	Atrop.	Atropina
Acon. Rad.	Aconiti Radix	Atrop. Sulph.	Atropinæ Sulphas
Aconitin.	Aconitina	Aurant. Cort. Ind.	Aurantii Cortex In- dicus
Adeps Benz.	Adeps Benzoatus	Aurant. Cort. Rec.	Aurantii Cortex Re- cens
Adeps Lanæ Hydr.	Adeps Lanæ Hy- drosus	Aurant. Cort. Sicc.	Aurantii Cortex Sic- catus
Adeps Præp.	Adeps Præparatus	Bals. Peruv.	Balsamum Peruvia- num
Adrenal.	Adrenalinum	Bals. Tolut.	Balsamum Toluta- num
Æth.	Æther	Belæ Fruct.	Belæ Fructus
Æth. Acet.	Æther Aceticus	Bellad. Fol.	Belladonnæ Folia
Æth. Pur.	Æther Purificatus	Bellad. Rad.	Belladonnæ Radix
Agropyrr.	Agropyrum	Benzamin. Lact.	Benzaminæ Lactas
Alcoh. Absol.	Alcohol Absolutum	Benzoin.	Benzoinum
Alston.	Alstonia	Berber.	Berberis
Alum. Exsic.	Alumen Exsiccatum	Bism. Carb.	Bismuthi Carbonas
Alum. Pur.	Alumen Purificatum	Bism. Salicyl.	Bismuthi Salicylas
Ammoniac.	Ammoniacum	Bism. Subnit.	Bismuthi Subnitras
Ammon. Benz.	Ammonii Benzoas	Borax Pur.	Borax Purificatus
Ammon. Brom.	Ammonii Bromidum	Buchu Fol.	Buchu Folia
Ammon. Carb.	Ammonii Carbonas	Buteæ Gum.	Buteæ Gummi
Ammon. Chlor.	Ammonii Chloridum	Buteæ Sem.	Buteæ Semina
Amygd. Amar.	Amygdala Amara	Butyl-Chloral Hydr.	Butyl-Chloral Hy- dras
Amygd. Dulc.	Amygdala Dulcis	Caffein.	Caffeina
Aneth. Fruct.	Anethi Fructus	Caffein. Cit.	Caffeinæ Citras
Anis. Fruct.	Anisi Fructus	Caffein. Cit. Eff.	Caffeinæ Citras Effer- vescens
Anthem. Flor.	Anthemidis Flores	Calc. Carb. Præc.	Calcii Carbonas Præ- cipitatus
Antim. Oxid.	Antimonii Oxidum	Calc. Chlor.	Calcii Chloridum
Antim. Sulphur.	Antimonium Sul- phuratum	Calc. Hydr.	Calcii Hydras
Antim. Tart.	Antimonium Tar- taratum	Calc. Hypophosph.	Calcii Hypophosphis
		Calc. Lact.	Calcii Lactas
		Calc. Phosph.	Calcii Phosphas

Abbreviated Latin Name	Full Latin Name
Calumb. Rad.	Calumbæ Radix
Calx Chlorin.	Calx Chlorinata
Calx Sulphur.	Calx Sulphurata
Camph.	Camphora
Cannab. Ind.	Cannabis Indica
Cantharidin.	Cantharidinum
Capsic. Fruct.	Capsici Fructus
Carbo Lign.	Carbo Ligni
Carbon. Disulph.	Carbonis Disulphidum
Cardam. Sem.	Cardamomi Semina
Carui Fruct.	Carui Fructus
Caryoph.	Caryophyllum
Casc. Sagr.	Cascara Sagrada
Cascarill.	Cascarilla
Cass. Fruct.	Cassiæ Fructus
Cass. Pulp.	Cassiæ Pulpa
Catech.	Catechu
Catech. Nigr.	Catechu Nigrum
Cera Alb.	Cera Alba
Cera Flav.	Cera Flava
Cetac.	Cetaceum
Chirat.	Chirata
Chloral Formam.	Chloral Formamidum
Chloral Hydr.	Chloral Hydras
Chlorof.	Chloroformum
Chrysarob.	Chrysarobinum
Cinch. Rubr. Cort.	Cinchonæ Rubræ Cortex
Cinnam. Cort.	Cinnamomi Cortex
Cocain.	Cocaina
Cocain. Hydrochl.	Cocainæ Hydrochlori- dum
Cocc.	Coccus
Codein.	Codeina
Codein. Phosph.	Codeinæ Phosphas
Colch. Corm.	Colchici Cormus
Colch. Sem.	Colchici Semina
Collod.	Collodium
Collod. Flex.	Collodium Flexile
Collod. Vesic.	Collodium Vesicans
Colocyn. Pulp.	Colocynthis Pulpa
Conf. Piper.	Confectio Piperis
Conf. Ros. Gall.	Confectio Rosæ Gal- licæ
Conf. Senn.	Confectio Sennæ
Conf. Sulphur.	Confectio Sulphuris
Copaib.	Copaiba
Coriand. Fruct.	Coriandri Fructus
Creosot.	Creosotum
Cret. Præp.	Creta Præparata
Cubeb. Fruct.	Cubebæ Fructus
Cucurb. Sem. Præp.	Cucurbitæ Semina Præparata
Cupr. Sulph.	Cupri Sulphas
Datur. Fol.	Daturæ Folia
Datur. Sem.	Daturæ Semina
Dec. Acac. Cort.	Decoctum Acaciæ Corticis
Dec. Agropyri.	Decoctum Agropyri
Dec. Aloes Co.	Decoctum Aloes Com- positum
Dec. Gossyp. Rad.	Decoctum Gossypii
Dec. Cort.	Radicis Corticis
Dec. Hæmatox.	Decoctum Hæmato- xylæ

Abbreviated Latin Name	Full Latin Name
Dec. Ispagh.	Decoctum Ispaghulæ
Dec. Sappan	Decoctum Sappan
Diamorph. Hydrochl.	Diamorphinæ Hydro- chloridum
Digit. Fol.	Digitalis Folia
Embel.	Embelia
Emp. Bellad.	Emplastrum Bella- donnæ
Emp. Calefac.	Emplastrum Cale- faciens
Emp. Cantharidin.	Emplastrum Can- tharidini
Emp. Hydrarg.	Emplastrum Hydrar- gyri
Emp. Menth.	Emplastrum Menthol
Emp. Plumb.	Emplastrum Plumbi
Emp. Res.	Emplastrum Resinæ
Emp. Sap.	Emplastrum Saponis
Ergot.	Ergota
Ethyl Chlor.	Ethyl Chloridum
Euonym. Cort.	Euonymi Cortex
Ext. Agropyri. Liq.	Extractum Agropyri Liquidum
Ext. Aloes	Extractum Aloes
Ext. Belæ Liq.	Extractum Belæ Li- quidum
Ext. Bellad. Liq.	Extractum Bella- donnæ Liquidum
Ext. Bellad. Sicc.	Extractum Bella- donnæ Siccum
Ext. Cannab. Ind.	Extractum Cannabis Indicæ
Ext. Casc. Sagr. Liq.	Extractum Cascaræ Sagrada Liquidum
Ext. Casc. Sagr. Sicc.	Extractum Cascaræ Sagrada Siccum
Ext. Cinch. Liq.	Extractum Cinchonæ Liquidum
Ext. Colch.	Extractum Colchici
Ext. Coloc. Co.	Extractum Colocyn- this Compositum
Ext. Ergot.	Extractum Ergotæ
Ext. Ergot. Liq.	Extractum Ergotæ Liquidum
Ext. Euonym.	Extractum Euonymi
Ext. Filic. Liq.	Extractum Filicis Liquidum
Ext. Gent.	Extractum Gentianæ
Ext. Glycyrrh.	Extractum Glycyrr- hizæ
Ext. Glycyrrh. Liq.	Extractum Glycyrr- hizæ Liquidum
Ext. Gossyp. Rad.	Extractum Gossypii
Cort. Liq.	Radicis Corticis Liquidum
Ext. Grindel. Liq.	Extractum Grindeliæ Liquidum
Ext. Hamam. Liq.	Extractum Hama- melidis Liquidum
Ext. Hydrast. Liq.	Extractum Hydras- tis Liquidum
Ext. Hyoscy.	Extractum Hyoscy- ami
Ext. Ipecac. Liq.	Extractum Ipecacu- anhæ Liquidum

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Ext. Kavæ Liq.	Extractum Kavæ Liquidum	Hæmatox. Lign.	Hæmatoxyli Lignum
Ext. Kramer.	Extractum Krameriaë	Hamam. Cort.	Hamamelidis Cortex
Ext. Nuc. Vom. Liq.	Extractum Nucis Vomicaë Liquidum	Hamam. Fol.	Hamamelidis Folia
Ext. Nuc. Vom. Sicc.	Extractum Nucis Vomicaë Siccum	Homatrop. Hydrobrom.	Homatropinaë Hydrobromidum
Ext. Opii Liq.	Extractum Opii Liquidum	Hydrarg. Iod. Rubr.	Hydrargyri Iodidum Rubrum
Ext. Opii Sicc.	Extractum Opii Siccum	Hydrarg. Oxid. Flav.	Hydrargyri Oxidum Flavum
Ext. Picrorh. Liq.	Extractum Picrorhizæ Liquidum	Hydrarg. Oxid. Rubr.	Hydrargyri Oxidum Rubrum
Ext. Rhei	Extractum Rhei	Hydrarg. Perchlor.	Hydrargyri Perchloridum
Ext. Strophanth.	Extractum Strophanthi	Hydrarg. Subchlor.	Hydrargyri Subchloridum
Ext. Tarax.	Extractum Taraxaci	Hydrarg.	Hydrargyrum
Ext. Viburn. Liq.	Extractum Viburni Liquidum	Hydrarg. Ammon.	Hydrargyrum Ammoniatum
Fel Bov. Pur.	Fel Bovinum Purificatum	Hydrarg. c. Cret.	Hydrargyrum cum Creta
Ferr. Carb. Sacch.	Ferri Carbonas Saccharatus	Hydrarg. Oleat.	Hydrargyrum Oleatum
Ferr. et Ammon. Cit.	Ferri et Ammonii Citras	Hydrast. Rhiz.	Hydrastis Rhizoma
Ferr. et Pot. Tart.	Ferri et Potassii Tartras	Hyoscin. Hydrobrom.	Hyoscinaë Hydrobromidum
Ferr. et Quin. Cit.	Ferri et Quininæ Citras	Hyoscy. Fol.	Hyoscyami Folia
Ferr. Phosph. Sacch.	Ferri Phosphas Saccharatus	Hyoscyamin. Sulph.	Hyoscyaminaë Sulphas
Ferr. Sulph.	Ferri Sulphas	Inf. Alston.	Infusum Alstoniæ
Ferr. Sulph. Exsic.	Ferri Sulphas Exsiccatus	Inf. Aurant.	Infusum Aurantii
Ferr.	Ferrum	Inf. Aurant. Co.	Infusum Aurantii Compositum
Ferr. Redact.	Ferrum Redactum	Inf. Buchu.	Infusum Buchu
Fœnic. Fruct.	Fœniculi Fructus	Inf. Calumb.	Infusum Calumbæ
Gall.	Galla	Inf. Caryoph.	Infusum Caryophylli
Gelsem. Rad.	Gelsemii Radix	Inf. Cascarill.	Infusum Cascarillæ
Gent. Rad.	Gentianæ Radix	Inf. Chirat.	Infusum Chiratæ
Glucos.	Glucosum	Inf. Cinch. Acid.	Infusum Cinchonæ Acidum
Glycer.	Glycerinum	Inf. Digit.	Infusum Digitalis
Glycer. Acid. Bor.	Glycerinum Borici	Inf. Ergot.	Infusum Ergotæ
Glycer. Acid. Carbol.	Glycerinum Carbolici	Inf. Gent. Co.	Infusum Gentianæ Compositum
Glycer. Acid. Tann.	Glycerinum Tannici	Inf. Kramer.	Infusum Krameriaë
Glycer. Alum.	Glycerinum Aluminis	Inf. Quass.	Infusum Quassiaë
Glycer. Amyli	Glycerinum Amyli	Inf. Rhei	Infusum Rhei
Glycer. Borac.	Glycerinum Boracis	Inf. Ros. Acid.	Infusum Rosæ Acidum
Glycer. Pepsin.	Glycerinum Pepsini	Inf. Scopar.	Infusum Scoparii
Glycer. Plumb.	Glycerinum Plumbi	Inf. Seneg.	Infusum Senegæ
Subacet.	Subacetatis	Inf. Senn.	Infusum Sennæ
Glycer. Trag.	Glycerinum Fragræcanthæ	Inf. Uv. Urs.	Infusum Uvæ Ursi
Glycyrrh. Rad.	Glycyrrhizæ Radix	Inject. Apomorph. Hyp.	Injectio Apomorphinaë Hypodermica
Gossyp. Rad. Cort.	Gossypii Radicis Cortex	Inject. Cocain. Hyp.	Injectio Cocainæ Hypodermica
Gossyp.	Gossypium	Inject. Ergot. Hyp.	Injectio Ergotæ Hypodermica
Grindelia.	Grindelia	Inject. Morph. Hyp.	Injectio Morphinaë Hypodermica
Guaiaac. Lign.	Guaiaaci Lignum	Inject. Strych. Hyp.	Injectio Strychninaë Hypodermica
Guaiaac. Res.	Guaiaaci Resina	Iodof.	Iodoformum
Guaiaacol Carb.	Guaiaacol Carbonas	Ipecac. Rad.	Ipecacuanhæ Radix
Gum. Ind.	Gummi Indicum		

Abbreviated Latin Name	Full Latin Name
Ipom. Rad.	Ipomœæ Radix
Ispagh.	Ispaghula
Jalap.	Jalapa
Jalap. Res.	Jalapæ Resina
Kalad.	Kaladana
Kalad. Res.	Kaladanæ Resina
Kavæ Rhiz.	Kavæ Rhizoma
Kino Eucalyp.	Kino Eucalypti
Kramer. Rad.	Krameria Radix
Lam. Atrop.	Lamellæ Atropinæ
Lam. Cocain.	Lamellæ Cocainæ
Lam. Homatrop.	Lamellæ Homatropinæ
Lam. Physostig.	Lamellæ Physostigminæ
Laurocer. Fol.	Laurocerasi Folia
Limon. Cort.	Limonis Cortex
Lini Sem.	Lini Semina
Lini Sem. Contus.	Lini Semina Contusa
Lin. Acon.	Linimentum Aconiti
Lin. Ammon.	Linimentum Ammonia
Lin. Bellad.	Linimentum Belladonna
Lin. Calc.	Linimentum Calcis
Lin. Camph.	Linimentum Camphoræ
Lin. Camph. Ammon.	Linimentum Camphoræ Ammoniatum
Lin. Chlorof.	Linimentum Chloroformi
Lin. Croton.	Linimentum Crotonis
Lin. Hydrarg.	Linimentum Hydrargyri
Lin. Opii	Linimentum Opii
Lin. Pot. Iod. c. Sap.	Linimentum Potassii Iodidi cum Sapone
Lin. Sap.	Linimentum Saponis
Lin. Sinap.	Linimentum Sinapis
Lin. Tereb.	Linimentum Terebinthinæ
Lin. Tereb. Acet.	Linimentum Terebinthinæ Aceticum
Liq. Acid. Chrom.	Liquor Acidii Chromici
Liq. Adrenal. Hydrochl.	Liquor Adrenalini Hydrochloricus
Liq. Ammon.	Liquor Ammonia
Liq. Ammon. Fort.	Liquor Ammonia Fortis
Liq. Ammon. Acet.	Liquor Ammonii Acetatis
Liq. Ammon. Cit.	Liquor Ammonii Citratis
Liq. Arsen.	Liquor Arsenicalis
Liq. Arsen. Hydrochl.	Liquor Arsenicalis Hydrochloricus
Liq. Arsen. et Hydrarg. Iod.	Liquor Arsenii et Hydrargyri Iodidi
Liq. Atrop. Sulph.	Liquor Atropinæ Sulphatis
Liq. Bism. et Ammon. Cit.	Liquor Bismuthi et Ammonii Citratis
Liq. Calcis	Liquor Calcis

Abbreviated Latin Name	Full Latin Name
Liq. Calcis Chlorin.	Liquor Calcis Chlorinatæ
Liq. Calcis Sacch.	Liquor Calcis Saccharatus
Liq. Cresol Sap.	Liquor Cresol Saponatus
Liq. Epispast.	Liquor Epispasticus
Liq. Ethyl Nitrit.	Liquor Ethyl Nitritus
Liq. Ferr. Perchlor.	Liquor Ferri Perchloridi
Liq. Ferr. Perchlor. Fort.	Liquor Ferri Perchloridi Fortis
Liq. Ferr. Persulph.	Liquor Ferri Persulphatis
Liq. Formaldehyd.	Liquor Formaldehydi
Liq. Formaldehyd. Sap.	Liquor Formaldehydi Saponatus
Liq. Hamam.	Liquor Hamamelidis
Liq. Hydrarg. Nit. Acid.	Liquor Hydrargyri Nitratis Acidus
Liq. Hydrarg. Perchlor.	Liquor Hydrargyri Perchloridi
Liq. Hydrog. Perox.	Liquor Hydrogenii Peroxidi
Liq. Mag. Bicarb.	Liquor Magnesii Bicarbonatis
Liq. Morph. Acet.	Liquor Morphinæ Acetatis
Liq. Morph. Hydrochl.	Liquor Morphinæ Hydrochloridi
Liq. Morph. Tart.	Liquor Morphinæ Tartratis
Liq. Pancreat.	Liquor Pancreatis
Liq. Fic. Carbon.	Liquor Picis Carbonis
Liq. Plumbi Subacet. Dil.	Liquor Plumbi Subacetatis Dilutus
Liq. Plumbi Subacet. Fort.	Liquor Plumbi Subacetatis Fortis
Liq. Potass.	Liquor Potassæ
Liq. Pot. Permang.	Liquor Potassii Permanganatis
Liq. Sodæ Chlorin.	Liquor Sodæ Chlorinatæ
Liq. Sod. Arsen.	Liquor Sodii Arsenatis
Liq. Strych. Hydrochl.	Liquor Strychnina Hydrochloridi
Liq. Trinitrin.	Liquor Trinitrini
Liq. Zinc. Chlor.	Liquor Zinci Chloridi
Lith. Carb.	Lithii Carbonas
Lith. Cit.	Lithii Citras
Lith. Cit. Eff.	Lithii Citras Efferescens
Lobel.	Lobelia
Lot. Hydrarg. Flav.	Lotio Hydrargyri Flava
Lot. Hydrarg. Nigr.	Lotio Hydrargyri Nigra
Mag. Lev.	Magnesia Levis
Mag. Pond.	Magnesia Ponderosa
Mag. Carb. Lev.	Magnesii Carbonas Levis
Mag. Carb. Pond.	Magnesii Carbonas Ponderosus
Mag. Sulph.	Magnesii Sulphas

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Mag. Sulph. Eff.	Magnesii Sulphas Effervescens	Ol. Sinap. Vol.	Oleum Sinapis Volatile
Mel Borac.	Mel Boracis	Ol. Tereb. Rectif.	Oleum Terebinthinæ Rectificatum
Mel Depur.	Mel Depuratum	Ol. Theobrom.	Oleum Theobromatis
Mist. Ammoniac.	Mistura Ammoniaci	Oliver. Cort.	Oliveri Cortex
Mist. Amygd.	Mistura Amygdalæ	Oxymel Scill.	Oxymel Scillæ
Mist. Cret.	Mistura Cretæ	Oxymel Uargin.	Oxymel Urginæ
Mist. Ferr. Co.	Mistura Ferri Composita	Paraff. Dur.	Paraffinum Durum
Mist. Guaiac.	Mistura Guaiaci	Paraff. Liq.	Paraffinum Liquidum
Mist. Ol. Ricin.	Mistura Olei Ricini	Paraff. Moll.	Paraffinum Molle
Mist. Senn. Co.	Mistura Sennæ Composita	Pellet. Tann.	Pelletierinæ Tannas
Morph. Acet.	Morphinæ Acetas	Pepsin.	Pepsinum
Morph. Hydrochl.	Morphinæ Hydrochloridum	Phenacet.	Phenacetinum
Morph. Tart.	Morphinæ Tartaras	Phosphor.	Phosphorus
Mucil. Acac.	Mucilago Acaciæ	Physostig. Sulph.	Physostigminæ Sulphas
Mucil. Gum. Ind.	Mucilago Gummi Indici	Picrorrh.	Picrorhiza
Mucil. Trag.	Mucilago Tragacanthæ	Pilocarp. Nit.	Pilocarpinæ Nitras
Myrist.	Myristica	Pil. Aloes	Pilula Aloes
Myrobal.	Myrobalanum	Pil. Aloes et Asafet.	Pilula Aloes et Asa-fetidæ
Myrrh.	Myrrha	Pil. Aloes et Ferr.	Pilula Aloes et Ferri
Nux Vom.	Nux Vomica	Pil. Aloes et Myrrh.	Pilula Aloes et Myrrhæ
Ol. Abiet.	Oleum Abietis	Pil. Colocyn. Co.	Pilula Colocynthidis Composita
Ol. Ajowan	Oleum Ajowan	Pil. Colocyn. et Hyoscy.	Pilula Colocynthidis et Hyoscyami
Ol. Amygd.	Oleum Amygdalæ	Pil. Ferr.	Pilula Ferri
Ol. Aneth.	Oleum Anethi	Pil. Hydrarg.	Pilula Hydrargyri
Ol. Anis.	Oleum Anisi	Pil. Hydrarg. Subchlor. Co.	Pilula Hydrargyri Subchloridi Composita
Ol. Anthem.	Oleum Anthemidis	Pil. Ipecac. c. Scill.	Pilula Ipecacuanhæ cum Scilla
Ol. Arach.	Oleum Arachidis	Pil. Ipecac. c. Uargin.	Pilula Ipecacuanhæ cum Urginæ
Ol. Cadin.	Oleum Cadinum	Pil. Phosphor.	Pilula Phosphori
Ol. Cajup.	Oleum Cajuputi	Pil. Plumb. c. Opio	Pilula Plumbi cum Opio
Ol. Carui	Oleum Carui	Pil. Quin. Sulph.	Pilula Quininæ Sulphatis
Ol. Caryoph.	Oleum Caryophylli	Pil. Rhei Co.	Pilula Rhei Composita
Ol. Chaulmoog.	Oleum Chaulmoogra	Pil. Sap. Co.	Pilula Saponis Composita
Ol. Cinnam.	Oleum Cinnamomi	Pil. Scill. Co.	Pilula Scillæ Composita
Ol. Copaib.	Oleum Copaibæ	Pil. Uargin. Co.	Pilula Urginæ Composita
Ol. Coriand.	Oleum Coriandri	Pix Carbon. Præp.	Pix Carbonis Præparata
Ol. Croton.	Oleum Crotonis	Pix Liq.	Pix Liquida
Ol. Cubeb.	Oleum Cubebæ	Plumb. Acet.	Plumbi Acetas
Ol. Eucalyp.	Oleum Eucalypti	Plumb. Iod.	Plumbi Iodidum
Ol. Gaulth.	Oleum Gaultheriæ	Plumb. Oxid.	Plumbi Oxidum
Ol. Gram. Citrat.	Oleum Graminis Citrati	Podoph. Ind. Res.	Podophylli Indici Resina
Ol. Junip.	Oleum Juniperi	Podoph. Ind. Rhiz.	Podophylli Indici Rhizoma
Ol. Lavand.	Oleum Lavandulæ	Podoph. Res.	Podophylli Resina
Ol. Limon.	Oleum Limonis	Podoph. Rhiz.	Podophylli Rhizoma
Ol. Lini	Oleum Lini	Potass. Caust.	Potassa Caustica
Ol. Menth. Pip.	Oleum Menthæ Piperitæ	Potass. Sulphur.	Potassa Sulphurata
Ol. Menth. Vir.	Oleum Menthæ Viridis		
Ol. Morrh.	Oleum Morrhuæ		
Ol. Myrist.	Oleum Myristicæ		
Ol. Oliv.	Oleum Olivæ		
Ol. Phosphor.	Oleum Phosphoratum		
Ol. Ricin.	Oleum Ricini		
Ol. Ros.	Oleum Rosæ		
Ol. Rosmarin.	Oleum Rosmarini		
Ol. Santal.	Oleum Santali		
Ol. Sesam.	Oleum Sesami		

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Pot. Acet.	Potassii Acetas	Santonin.	Santoninum
Pot. Bicarb.	Potassii Bicarbonas	Sap. Animal.	Sapo Animalis
Pot. Bichrom.	Potassii Bichromas	Sap. Dur.	Sapo Durus
Pot. Brom.	Potassii Bromidum	Sap. Moll.	Sapo Mollis
Pot. Carb.	Potassii Carbonas	Scammon. Rad.	Scammoniaë Radix
Pot. Chloras	Potassii Chloras	Scammon. Res.	Scammoniaë Resina
Pot. Cit.	Potassii Citras	Scilla.	Scilla
Pot. Iod.	Potassii Iodidum	Scopar. Cacum.	Scoparii Cacumina
Pot. Nit.	Potassii Nitras	Seneg. Rad.	Senegæ Radix
Pot. Permang.	Potassii Permanganas	Senn. Fol.	Sennæ Folia
Pot. Sulph.	Potassii Sulphas	Senn. Fruct.	Sennæ Fructus
Pot. Tart.	Potassii Tartras	Serpent. Rhiz.	Serpentariaë Rhizoma
Pot. Tart. Acid.	Potassii Tartras Acidus	Sev. Benz.	Sevum Benzoatum
Prun. Virgin. Cort.	Pruni Virginianæ Cortex	Sev. Præp.	Sevum Præparatum
Pterocarp. Lign.	Pterocarpi Lignum	Sod. Arsen. Anhydr.	Sodii Arsenas Anhy- drosus
Pulv. Amygd. Co.	Pulvis Amygdalæ Compositus	Sod. Benz.	Sodii Benzoas
Pulv. Antim.	Pulvis Antimonialis	Sod. Bicarb.	Sodii Bicarbonas
Pulv. Buteæ Sem.	Pulvis Buteæ Semi- num	Sod. Brom.	Sodii Bromidum
Pulv. Catech. Co.	Pulvis Catechu Com- positus	Sod. Carb.	Sodii Carbonas
Pulv. Cinnam. Co.	Pulvis Cinnamomi Compositus	Sod. Carb. Exsic.	Sodii Carbonas Ex- siccatus
Pulv. Cret. Aromat.	Pulvis Cretæ Aromat- icus	Sod. Chlor.	Sodii Chloridum
Pulv. Cret. Aromat. c. Opio	Pulvis Cretæ Aromat- icus cum Opio	Sod. Citro-Tart. Eff.	Sodii Citro-Tartras Effervescens
Pulv. Glycyrrh. Co.	Pulvis Glycyrrhizæ Compositus	Sod. et Pot. Tart.	Sodii et Potassii Tartras
Pulv. Ipecac. Co.	Pulvis Ipecacuanhæ Compositus	Sod. Hypophosph.	Sodii Hypophosphis
Pulv. Jalap. Co.	Pulvis Jalapæ Com- positus	Sod. Iod.	Sodii Iodidum
Pulv. Kalad. Co.	Pulvis Kaladanæ Compositus	Sod. Nitris	Sodii Nitris
Pulv. Kino Co.	Pulvis Kino Com- positus	Sod. Phosph.	Sodii Phosphas
Pulv. Opii Co.	Pulvis Opii Com- positus	Sod. Phosph. Acid.	Sodii Phosphas Ac- idus
Pulv. Rhei Co.	Pulvis Rhei Com- positus	Sod. Phosph. Eff.	Sodii Phosphas Effer- vescens
Pulv. Scammon. Co.	Pulvis Scammoniaë Compositus	Sod. Salicyl.	Sodii Salicylas
Pulv. Sodæ Tart. Eff.	Pulvis Sodæ Tarta- ratæ Effervescens	Sod. Sulph.	Sodii Sulphas
Pulv. Trag. Co.	Pulvis Tragacanthæ Compositus	Sod. Sulph. Eff.	Sodii Sulphas Effer- vescens
Pyreth. Rad.	Pyrethri Radix	Sod. Sulphis	Sodii Sulphis
Quass. Lign.	Quassiaë Lignum	Sp. Æth.	Spiritus Ætheris
Quill. Cort.	Quillaiaë Cortex	Sp. Æth. Nitros.	Spiritus Ætheris Ni- trosi
Quin. Hydrochl.	Quininæ Hydrochlo- ridum	Sp. Ammon. Aromat.	Spiritus Ammoniaë Aromaticus
Quin. Hydrochl. Acid.	Quininæ Hydrochlo- ridum Acidum	Sp. Ammon. Fet.	Spiritus Ammoniaë Fetidus
Quin. Sulph. Res.	Quininæ Sulphas Resina	Sp. Anis.	Spiritus Anisi
Rhei Rhiz.	Rhei Rhizoma	Sp. Armor. Co.	Spiritus Armoraciaë Compositus
Rhœad. Pet.	Rhœadosis Pétala	Sp. Cajup.	Spiritus Cajuputi
Ros. Gall. Pet.	Rosæ Gallicaë Petala	Sp. Camph.	Spiritus Camphoræ
Sacch. Lact.	Saccharum Lactis	Sp. Chlorof.	Spiritus Chloroformi
Sacch. Pur.	Saccharum Purifica- tum	Sp. Cinnam.	Spiritus Cinnamomi
		Sp. Junip.	Spiritus Juniperi
		Sp. Lavand.	Spiritus Lavandulæ
		Sp. Menth. Pip.	Spiritus Menthæ Piperitæ
		Sp. Myrist.	Spiritus Myristicæ
		Sp. Rectif.	Spiritus Rectificatus
		Sp. Rosmarin.	Spiritus Rosmarini
		Staphisag. Sem.	Staphisagriaë Semina
		Stramon. Fol.	Stramonii Folia
		Stront. Brom.	Strontii Bromidum
		Strophanth. Sem.	Strophanthi Semina

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Strych.	Strychnina	Tr. Alston.	Tinctura Alstoniæ
Strych. Hydrochl.	Strychninæ Hydrochloridum	Tr. Arnica. Flor.	Tinctura Arnicæ Florum
Styrax Præp.	Styrax Præparatus	Tr. Asafet.	Tinctura Asafetidæ
Succ. Limon.	Succus Limonis	Tr. Aurant.	Tinctura Aurantii
Succ. Scopar.	Succus Scoparii	Tr. Bellad.	Tinctura Belladonnæ
Succ. Tarax.	Succus Taraxaci	Tr. Benzoin. Co.	Tinctura Benzoini Composita
Sulphur Præc.	Sulphur Præcipitatum	Tr. Berber.	Tinctura Berberidis
Sulphur Sublim.	Sulphur Sublimatum	Tr. Buchu	Tinctura Buchu
Supp. Acid. Carbol.	Suppositoria Acidi Carbolici	Tr. Calumb.	Tinctura Calumbæ
Supp. Acid. Tann.	Suppositoria Acidi Tannici	Tr. Camph. Co.	Tinctura Camphoræ Composita
Supp. Bellad.	Suppositoria Belladonnæ	Tr. Cannab. Ind.	Tinctura Cannabis Indicæ
Supp. Glycer.	Suppositoria Glycerini	Tr. Cantharidin.	Tinctura Cantharidini
Supp. Iodof.	Suppositoria Iodoformi	Tr. Capsic.	Tinctura Capsici
Supp. Morph.	Suppositoria Morphinæ	Tr. Cardam. Co.	Tinctura Cardamomi Composita
Supp. Plumb. Co.	Suppositoria Plumbi Composita	Tr. Cascarill.	Tinctura Cascarillæ
Syr.	Syrupus	Tr. Catech.	Tinctura Catechu
Syr. Acid. Hydriod.	Syrupus Acidi Hydriodici	Tr. Chirat.	Tinctura Chiratae
Syr. Aromat.	Syrupus Aromaticus	Tr. Chlorof. et Morph. Co.	Tinctura Chloroformi et Morphinæ Composita
Syr. Aurant.	Syrupus Aurantii	Tr. Cinch.	Tinctura Cinchonæ
Syr. Aurant. Flor.	Syrupus Aurantii Floris	Tr. Cinch. Co.	Tinctura Cinchonæ Composita
Syr. Calc. Lactophosph.	Syrupus Calcii Lactophosphatis	Tr. Cinnam. *	Tinctura Cinnamomi
Syr. Casc. Aromat.	Syrupus Cascaræ Aromaticus	Tr. Cocc.	Tinctura Cocci
Syr. Chloral	Syrupus Chloral	Tr. Colch.	Tinctura Colchici
Syr. Codein. Phosph.	Syrupus Codeinæ Phosphatis	Tr. Cubeb.	Tinctura Cubebæ
Syr. Ferr. Iod.	Syrupus Ferri Iodidi	Tr. Datur. Sem.	Tinctura Daturæ Seminum
Syr. Ferr. Phosph.	Syrupus Ferri Phosphatis	Tr. Digit.	Tinctura Digitalis
Syr. Ferr. Phosph. c. Quin. et Strych.	Syrupus Ferri Phosphatis cum Quinina et Strychnina	Tr. Ergot. Ammon.	Tinctura Ergotæ Ammoniata
Syr. Glucos.	Syrupus Glucosi	Tr. Ferr. Perchlor.	Tinctura Ferri Perchloridi
Syr. Limon.	Syrupus Limonis	Tr. Gelsem.	Tinctura Gelsemii
Syr. Prun. Virgin.	Syrupus Pruni Virginianæ	Tr. Gent. Co.	Tinctura Gentianæ Composita
Syr. Rhei	Syrupus Rhei	Tr. Guaiac. Ammon.	Tinctura Guaiaci Ammoniata
Syr. Rhœad.	Syrupus Rhœados	Tr. Hamam.	Tinctura Hamamelidis
Syr. Ros.	Syrupus Rosæ	Tr. Hydrast.	Tinctura Hydrastis
Syr. Scill.	Syrupus Scillæ	Tr. Hyoscy.	Tinctura Hyoscyami
Syr. Senn.	Syrupus Sennæ	Tr. Iodi Fort.	Tinctura Iodi Fortis
Syr. Tolut.	Syrupus Tolutanus	Tr. Iodi Mit.	Tinctura Iodi Mitis
Syr. Urgan.	Syrupus Urganæ	Tr. Jalap.	Tinctura Jalapæ
Syr. Zingib.	Syrupus Zingiberis	Tr. Jalap. Co.	Tinctura Jalapæ Composita
Tab. Trinitrin.	Tabellæ Trinitrini	Tr. Kalad.	Tinctura Kaladanæ
Tarax. Rad.	Taraxaci Radix	Tr. Kino	Tinctura Kino
Tereb. Canad.	Terebinthina Canadensis	Tr. Kramer.	Tinctura Kramerie
Theobrom. et Sod. Salicyl.	Theobrominæ et Sodii Salicylas	Tr. Lavand. Co.	Tinctura Lavandulæ Composita
Thyroid. Sicc.	Thyroideum Siccum	Tr. Limon.	Tinctura Limonis
Tr. Acon.	Tinctura Aconiti	Tr. Lobel. Æth.	Tinctura Lobeliæ Æthereæ
		Tr. Myrrh.	Tinctura Myrrhæ
		Tr. Nuc. Vom.	Tinctura Nucis Vomice

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Tr. Oliver. Cort.	Tinctura Oliveri Corticis	Ung. Acid. Carbol.	Unguentum Carbolicum Acidi
Tr. Opii	Tinctura Opii	Ung. Acid. Salicyl.	Unguentum Salicylicum Acidi
Tr. Opii Ammon.	Tinctura Opii Ammoniatæ	Ung. Aconitin.	Unguentum Aconitinæ
Tr. Picrorrh.	Tinctura Picrorhizæ	Ung. Aq. Ros.	Unguentum Rosæ Aquæ
Tr. Podoph.	Tinctura Podophylli	Ung. Atrop.	Unguentum Atropinæ
Tr. Podoph. Ind.	Tinctura Podophylli Indici	Ung. Bellad.	Unguentum Belladonnæ
Tr. Prun. Virgin.	Tinctura Pruni Virginianæ	Ung. Cantharidin.	Unguentum Cantharidini
Tr. Pyreth.	Tinctura Pyrethri	Ung. Capsic.	Unguentum Capsici
Tr. Quass.	Tinctura Quassiaæ	Ung. Cetac.	Unguentum Cetacei
Tr. Quill.	Tinctura Quillaiaæ	Ung. Chaulmoog.	Unguentum Chaulmoogræ
Tr. Quin.	Tinctura Quininæ	Ung. Chrysarob.	Unguentum Chrysarobini
Tr. Quin. Ammon.	Tinctura Quininæ Ammoniatæ	Ung. Cocain.	Unguentum Cocainæ
Tr. Rhei Co.	Tinctura Rhei Composita	Ung. Creosot.	Unguentum Creosoti
Tr. Scill.	Tinctura Scillaæ	Ung. Eucalyp.	Unguentum Eucalypti
Tr. Seneg.	Tinctura Senegæ	Ung. Gall.	Unguentum Gallæ
Tr. Senn. Co.	Tinctura Sennæ Composita	Ung. Gall. c. Opio	Unguentum Gallæ cum Opio
Tr. Serpent.	Tinctura Serpentariæ	Ung. Hamam.	Unguentum Hamamelidis
Tr. Stramon.	Tinctura Stramonii	Ung. Hydrarg.	Unguentum Hydrargyri
Tr. Strophanth.	Tinctura Strophanthi	Ung. Hydrarg. Ammon.	Unguentum Hydrargyri Ammoniatæ
Tr. Tolut.	Tinctura Tolutana	Ung. Hydrarg. Co.	Unguentum Hydrargyri Compositum
Tr. Urgin.	Tinctura Urginæ	Ung. Hydrarg. Iod. Rubr.	Unguentum Hydrargyri Iodidi Rubri
Tr. Valer. Ammon.	Tinctura Valerianæ Ammoniatæ	Ung. Hydrarg. Nit.	Unguentum Hydrargyri Nitratis
Tr. Valer. Ind. Ammon.	Tinctura Valerianæ Indicæ Ammoniatæ	Ung. Hydrarg. Nit. Dil.	Unguentum Hydrargyri Nitratis Dilutum
Tr. Zingib.	Tinctura Zingiberis	Ung. Hydrarg. Oleat.	Unguentum Hydrargyri Oleati
Trag.	Tragacantha	Ung. Hydrarg. Oxid. Flav.	Unguentum Hydrargyri Oxidi Flavi
Troch. Acid. Benz.	Trochiscus Benzoiaci Acidi	Ung. Hydrarg. Oxid. Rubr.	Unguentum Hydrargyri Oxidi Rubri
Troch. Acid. Carbol.	Trochiscus Acidi Carbolicum	Ung. Hydrarg. Subchlor.	Unguentum Hydrargyri Subchloridi
Troch. Acid. Tann.	Trochiscus Tannici Acidi	Ung. Iodi	Unguentum Iodi
Troch. Bism. Co.	Trochiscus Bismuthi Compositus	Ung. Iodof.	Unguentum Iodoformi
Troch. Catech.	Trochiscus Catechu	Ung. Lanæ Co.	Unguentum Lanæ Compositum
Troch. Ferr. Redact.	Trochiscus Ferri Redacti	Ung. Myrobal.	Unguentum Myrobalani
Troch. Guaiac. Res.	Trochiscus Guaiacæ Resinæ	Ung. Myrobal. c. Opio	Unguentum Myrobalani cum Opio
Troch. Ipecac.	Trochiscus Ipecacuanhæ	Ung. Paraff.	Unguentum Paraffini
Troch. Kino Eucalyp.	Trochiscus Kino Eucalypti	Ung. Pic. Liq.	Unguentum Picis Liquidæ
Troch. Kramer.	Trochiscus Krameriaæ	Ung. Plumb. Iod.	Unguentum Plumbi Iodidi
Troch. Kramer. et Cocain.	Trochiscus Krameriaæ et Cocainæ		
Troch. Morph.	Trochiscus Morphinæ		
Troch. Morph. et Ipecac.	Trochiscus Morphinæ et Ipecacuanhæ		
Troch. Pot. Chlorat.	Trochiscus Potassii Chloratis		
Troch. Santonin.	Trochiscus Santonini		
Troch. Sulphur.	Trochiscus Sulphuris		
Turpeth.	Turpethum		
Ung. Acid. Bor.	Unguentum Borici Acidi		

Abbreviated Latin Name	Full Latin Name	Abbreviated Latin Name	Full Latin Name
Ung. Plumb. Sub- acet.	Unguentum Plumbi Subacetatis	Vin. Antim.	Vinum Antimoniale
Ung. Pot. Iod.	Unguentum Potassii Iodidi	Vin. Aurant.	Vinum Aurantii
Ung. Res.	Unguentum Resinæ	Vin. Colch.	Vinum Colchici
Ung. Staphisag.	Unguentum Staphis- agriæ	Vin. Ferr.	Vinum Ferri
Ung. Sulphur.	Unguentum Sulphuris	Vin. Ferr. Cit.	Vinum Ferri Cit- ratis
Ung. Zinc.	Unguentum Zinci	Vin. Ipecac.	Vinum Ipecacuanhæ
Ung. Zinc. Oleat.	Unguentum Zinci Oleatis	Vin. Quin.	Vinum Quininæ
Urgin.	Urginea	Vin. Xeric.	Vinum Xericum
Uv. Urs. Fol.	Uvæ Ursi Folia	Zinc. Acet.	Zinci Acetas
Valer. Ind. Rhiz.	Valerianæ Indicæ Rhizoma	Zinc. Carb.	Zinci Carbonas
Valer. Rhiz.	Valerianæ Rhizoma	Zinc. Chlor.	Zinci Chloridum
Viburn.	Viburnum	Zinc. Oleost.	Zinci Oleostearas
		Zinc. Oxid.	Zinci Oxidum
		Zinc. Sulph.	Zinci Sulphas
		Zinc. Valer.	Zinci Valerianas
		Zingib.	Zingiber

FOREIGN PRESCRIPTION TERMS.

The following is a list of the abbreviations used in this Dictionary to indicate the languages :

<i>D.</i> = Dutch.	<i>G.L.</i> = German-Latin.	<i>P.</i> = Portuguese.
<i>Fr.</i> = French.	<i>I.</i> = Italian.	<i>S.</i> = Spanish.
<i>Ger.</i> = German.	<i>N.</i> = Norwegian.	

In many cases words are followed by phrases (in parentheses) embracing them which are commonly used in foreign prescriptions. It should not be difficult for dispensers to pick out words from autograph prescriptions presented to them and get at the meanings by reference to these pages.

A, <i>P.</i> , the (feminine).	Abführen, <i>Ger.</i> , to purge ; Ab-
A, à, <i>Fr.</i> , to, or. Trois à quatre	führungsmittel, an aperient medi-
paquets. (Three or four powders.)	cine.
A caldo, <i>I.</i> , warmed.	Abkochung, <i>Ger.</i> , decoction.
A gradi, <i>I.</i> , by degrees.	Aceite, <i>S.</i> , azeite, <i>P.</i> , oil (or
A la hora de acostarse, <i>S.</i> , at bed-	lubricant, <i>e.g.</i> embrocation).
time.	Aceite de higado de bacalao, <i>S.</i> ,
A man dritta, <i>I.</i> , on the right.	cod-liver oil.
A man sinistra, <i>I.</i> , on the left.	Aceticum, <i>G.L.</i> , acetate.
A meno che, <i>I.</i> , unless.	Aceto, <i>I.</i> , vinegar.
A menos que, <i>P.</i> and <i>S.</i> , unless.	Acetum plumbi, <i>G.L.</i> , liq. plumbi
A moins que, <i>Fr.</i> , unless.	subacet. fort.
A no ser que, <i>S.</i> , unless.	Acetum saturni, <i>G.L.</i> , liq. plumbi
A piacere, <i>I.</i> , to [your] liking.	subacet. fort.
Abbruciamento, <i>I.</i> , a burn.	Acibar, <i>S.</i> , aloes.
Abend, <i>Ger.</i> , evening ; abends, in	Acide azotique, <i>Fr.</i> , nitric acid.
the evening.	Acido agallico, <i>S.</i> , gallic acid.
Abendessen, Abend -brod, -mahl-	Acido fenico, <i>S.</i> , carbolic acid.
zeit, -tisch, <i>Ger.</i> , supper. Drei	Acido timico, <i>S.</i> , thymol.
von diesen Pillen vor dem Abend-	Acima, <i>P.</i> , above.
essen. (Three of these pills be-	Acqua, <i>I.</i> , water.
fore supper.)	Acqua di calce, <i>I.</i> , lime-water.

Acqua vitæ, *I.*, brandy.
 Adormidera, *S.*, poppy-capsules.
 Aerztliche Anweisung, *Ger.*, doctor's orders.
 Aetzammon, *Ger.*, liquor ammoniæ.
 Aetznatron, *Ger.*, caustic soda.
 Aetzstein, *Ger.*, caustic potash.
 Aeusserlich, *Ger.*, external.
 Aften, *N.*, evening.
 Agalla, *S.*, nutgall.
 Aggiungere, *I.*, to add. Aggiungere un po d'acqua, add a little water.
 Aggiungere un cucchiaino ad un $\frac{1}{2}$ litro di acqua bollente, e fare inalazioni colla evaporazione, *I.*, one teaspoonful to half a litre of boiling water, and the steam inhaled.
 Agitare la bottiglia prima di usarla, *I.*, the bottle having been first shaken.
 Agiter, *Fr.*, shake (*see* Flacon).
 Aglio, *I.*, garlic.
 Agrodolce, *I.*, bittersweet.
 Agua azucarada, *S.*, sweetened water.
 Agua de alcatrao, *P.*, tar-water.
 Agua de brea, *S.*, tar-water.
 Agua oxigenada, *S.*, sol. hydrog. perox. (10 vol.); agua saturada de oxigeno, oxygenated water (not sol. hyd. perox.).
 Agua para lavar la boca, *S.*, mouth-wash; a.p.l. los ojos, eye-wash.
 Agua phagedenica, *S.*, lotio hydrarg. flav.
 Ajenjo, *S.*, wormwood.
 Al acostarse, *S.*, lying down.
 Al di sopra, *I.*, above.
 Alaun, *Fr.*, alum.
 Albayalde cerusa, *S.*, lead carbonate.

Alcaçus, *P.*, liquorice.
 Alcarabea, *S.*, alcaravie, *P.*, caraway.
 Alcatrao, *P.*, wood-tar.
 Alcohol sulphuris, *G.L.*, carbon bisulphide.
 Alcool, *Fr.* and *I.*, alcohol.
 Alcool de soufre, *Fr.*, carbon bisulphide.
 Alcoolat, *Fr.*, a distilled tincture.
 Alcoolature, *Fr.*, a tincture of a fresh plant.
 Alle Viertel Stunden, *Ger.*, every quarter-hour.
 Alle zwei Stunden, *Ger.*, every other hour.
 Allmählich, *Ger.*, by degrees.
 Allora, *I.*, then.
 Almoço, *P.*, breakfast (lunch).
 Almuerzo, *S.*, breakfast (lunch).
 Altro, *I.*, other.
 Altschädenwasser, *Ger.*, lotio hydragryri flava, yellow wash.
 Alvaiade, *P.*, lead carbonate.
 Alvo, *I.*, abdomen.
 Amanhã de noite, *P.*, to-morrow night.
 Amanhã pela manhã, *P.*, to-morrow morning.
 Amapola, *S.*, red-poppy petals.
 Ameisenspiritus, *Ger.*, spt. formicarum, spirit of ants, or formic spirit.
 Ammoniac, *I.*, ammonia.
 Amoras, *P.*, mulberry-juice.
 Angenommen, *Ger.*, taken.
 Angrebne sted, *N.*, affected part.
 Anthos, *G.L.*, rosemary.
 Anvendes, *N.*, to be applied.
 Anwenden, *Ger.*, apply.
 Anzugeben, *Ger.*, administer or give.
 Aperitif, *Fr.*, aperient.

Applique se suavemente al sitio del dolor, *S.*, apply gently to the painful parts.

Applicare, *I.*, apply.

Applicare la filaccia sulla ferita, frequentemente; e quando sia asciuttaripetere di nuovo l'applicazione, *I.*, apply lint to the wound frequently; as soon as dry repeat the application.

Applica-se suavemente na sede da dôr, *P.*, it is applied gently to the painful part.

Applicate gentilmente sulla parte del dolore, *I.*, apply gently to the seat of pain.

Applicazione, *I.*, application.

Approximadamente, *P.*, about (more or less). Perto (de), near (to).

Après les repas, *Fr.*, after meals.

Aproximativamente, *S.*, about (more or less).

Aqua calcariae, *G.L.*, lime-water.

Aqua chlorata, *G.L.*, chlorine-water.

Aqua phagadænica, *G.L.*, lotio hydrarg. flava.

Aqua saturni, *G.L.*, liq. plumbi subacet. dil.

Aquecido, *P.*, warmed.

Aquila alba, *G.L.*, calomel.

Arsenige Säure, *Ger.*, arsenious acid.

Arsensäure, *Ger.*, arsenic acid.

Arznei, *Ger.*, medicine.

Ascesso, *I.*, abscess.

Assencio, *I.*, wormwood.

Assucar de leite, *P.*, milk sugar.

Athem, *Ger.*, breath. Kurzer Athem, shortness of breath.

Atras, *S.*, behind.

Atraz, *P.*, behind.

Attaque de toux, *Fr.*, coughing.

Au dessus, *Fr.*, above.

Auf Zucker, *Ger.*, on sugar.

Aufbrausen, *Ger.*, to effervesce.

Auflösen, *Ger.*, dissolve.

Augenstein, *Ger.*, eyestone, lapis divinus.

Augenwasser, *Ger.*, eye-water, eye-wash.

Aumentar, *S.*, increase.

Ausgenommen wenn, *Ger.*, unless.

Ausgiessen, *Ger.*, pour off.

Auspülung, *Ger.*, irrigation.

Aussi, *Fr.*, also.

Avaler, *Fr.*, to take; avalé, taken.

Avant le coucher, *Fr.*, at bedtime.

Ayer, *S.*, yesterday.

Azafran, *S.*, saffron.

Azahar, *S.*, orange-flower.

Azotate, *Fr.*, nitrate.

Azucar, *S.*, sugar.

Azufre, *S.*, sulphur.

Badigeonnages de teinture d'iode, *Fr.*, apply tincture of iodine.

Bagnarsi gli occhi, *I.*, eye-wash.

Bagnate gli occhi, *I.*, bathe the eyes.

Bagno, *I.*, bath.

Baldrian, *Ger.*, valerian.

Banha, *P.*, lard.

Bano, *S.*, bath.

Barbotine, *Fr.*, santonica.

Barnizar, *S.*, to varnish.

Baudruche, *Fr.*, goldbeater's skin.

Beber, *P.* and *S.*, to drink.

Becher, *Ger.*, a cup.

Beim zu Bett gehen, *Ger.*, at bedtime.

Beleno, *S.*, henbane.

Bem, *P.*, well.

Benjui, *S.*, benzoin.

Betupfen, *Ger.*, to dab

Bicchiere, *I.*, glass

- Bien, *Fr.* and *S.*, well. Bien agiter le flacon. (The bottle to be well shaken.)
- Bis, *I.*, twice.
- Bis auf, *Ger.*, up to.
- Bisse, *Ger.*, bolus. Sechs Bissen im Tage zu nehmen auf drei Gaben vertheilt. (Six boluses to be taken daily, divided into three doses.)
- Blanc de baleine, *Fr.*, spermaceti.
- Blanc d'œuf, *Fr.*, white of an egg.
- Blauholz, *Ger.*, logwood.
- Bleissig, *Ger.*, liq. plumbi subacet. fort.
- Blutegel, *Ger.*, leech.
- Bocca, *I.*, mouth.
- Bodelha, *P.*, bladder-wrack (*fucus*).
- Boire, *Fr.*, drink.
- Bois de Campêche, *Fr.*, logwood.
- Bol, *Fr.*, bolus. A prendre six bols par jour en les partageant en trois doses. (Six boluses to be taken every day, dividing them into three doses).
- Bollente, *I.*, boiling; bollire, to boil.
- Borace, *I.*, borax.
- Borsa da ghiaccio, *I.*, ice-bag.
- Borsäure, *Ger.*, boric acid.
- Botella bien agitada, *S.*, bottle well shaken.
- Bottiglia ben agitata, *I.*, the bottle to be well shaken.
- Bouillant, *Fr.*, boiling.
- Bourdaïne, *Fr.*, *rhamnus frangula*.
- Braking, *D.*, vomiting.
- Brandwunde, *Ger.*, a burn.
- Brea, *S.*, wood-tar.
- Bringen, *Ger.*, to bring, to place in.
- Bromure, *Fr.*, bromide.
- Bromuro, *S.*, bromide.
- Brustpulver, *Ger.*, pulv. glycyrrh. co.
- Bullrichs Salz, *Ger.*, sodii bicarb.
- Busserole, *Fr.*, bearberry.
- Cabelludo, *S.*, hairy. El cabello del cráneo, scalp (hair).
- Cabretilla, *S.*, kid leather.
- Cada, *S.*, every; cada dia, daily; cada dos horas, every two hours.
- Cadera, *S.*, hip.
- Cal, *S.*, lime.
- Calcaria, *G.L.*, calx or calcium.
- Caldo, *I.*, hot.
- Calentado, *S.*, warmed.
- Calmante, *I.*, sedative.
- Calvo, *P.* and *S.*, bald.
- Campeche, *P.*, logwood.
- Canamo, *S.*, canhamo, *P.*, Indian hemp.
- Canforo, *I.*, camphor.
- Capelli, *I.*, hair.
- Capillo, *S.*, brush.
- Carboneum, *G.L.*, carbon.
- Carbonicum, *G.L.*, carbonas or carbonate.
- Cardenillo, *P.* and *S.*, copper subacetate.
- Carta, *I.*, paper.
- Cascara, *S.*, bark. Cascara sagrada, sacred bark.
- Casse en batues, *Fr.*, cassia pulp.
- Catetere, *I.*, catheter.
- Cato, *P.*, catechu.
- Catrame vegetale, *I.*, wood-tar.
- Cautamente, *P.*, cautiously.
- Cautère potentiel, *Fr.*, caustic potash.
- Cebada, *S.*, pearl barley.
- Cedro, *I.*, lemon.
- Cera di spagna, *I.*, sealing-wax.
- Cerca, *S.*, near, near to.
- Ceroto, *I.*, plaster.

- Cevada santa, *P.*, pearl barley.
 Chamomilla vulgaris, *G.L.*, Matricaria Chamomilla.
 Chanvre, *Fr.*, Indian hemp.
 Chaque jour, *Fr.*, daily.
 Charpie, *Fr.*, lint.
 Chauffé, *Fr.*, warmed.
 Chaux, *Fr.*, lime.
 Chaux éteinte, *Fr.*, slaked lime.
 Chavena, *P.*, drinking-cup.
 Chêne, *Fr.*, oak-bark.
 Chiaramente, *I.*, clearly.
 Chicara, *P.*, cup.
 Chien-dent, *Fr.*, couch-grass.
 Chinæ cortex, *G.L.*, cinchona-bark.
 Chinarinde, *Ger.*, cinchona-bark.
 Chinin, *Ger.*, quinine.
 Chinina, *I.*, quinine.
 Chininum, *G.L.*, quinine.
 Chirurgo, *I.*, surgeon.
 Chloratum, *G.L.*, chloride.
 Chlore dissous, *Fr.*, chlorine solution.
 Chloricum, *G.L.*, chlorate.
 Chlorsäures, *Ger.*, chlorate.
 Chlorure, *Fr.*, chloride.
 Chlorure mercurieux, *Fr.*, calomel.
 Chlorure mercurique, *Fr.*, corrosive sublimate.
 Cinchonium, *G.L.*, cinchonine.
 Cinnamon, *G.L.*, cassia. Consperg. pulv. cass. cinnam. (Sprinkle [the pills] with powdered cassia.)
 Cito ! citissime ! *G.L.*, quickly, very quickly (indicating that the prescription is urgently required).
 Citrato, *I.*, citrate, but the common name for citrate of magnesia.
 Citricum, *G.L.*, citrate.
 Citron, *Fr.*, lemon.
 Citronsäures, *Ger.*, citrate.
 Clavo, *S.*, clove.
 Cloruro di calce, *I.*, chlorinated lime.
 Coar, *P.*, to strain.
 Coccionella, *G.L.*, cochineal.
 Coentro, *P.*, coriander.
 (Le) Cœur, *Fr.*, the heart.
 Coffein, *Ger.*, caffeine.
 Coing, *Fr.*, quince.
 Colantro, *S.*, coriander.
 Colar, *S.*, to strain.
 Colher cheia, *P.*, spoonful.
 Colher de chá cheia, *P.*, teaspoonful.
 Colher de doce cheia, *P.*, dessert-spoonful.
 Colher de sopa cheia, *P.*, table-spoonful (soup-spoon).
 Colla piscium, *G.L.*, ichthyocolla.
 Collazione, *I.*, meal.
 Collirio, *I.*, eye-lotion.
 Collutoire, *Fr.*, Colutorio, *S.*, throat-paint.
 Collyre, *Fr.*, eye-wash.
 Com cuidado, *P.*, cautiously.
 Com precisão, *P.*, accurately.
 Come fu detto, *I.*, as previously directed.
 Comidas, *S.*, meals ; comida, dinner.
 Con cuidado, *S.*, with care.
 Con ostie, *I.*, with wafers.
 Contagocce, *I.*, medicine-droppers.
 Copa, *S.*, glass ; copita, wineglass.
 Coquelicot, *Fr.*, red poppies.
 Coração, o, *P.*, the heart.
 Corazon, el, *S.*, the heart.
 Cornezuelo de centeno, *S.*, ergot.
 Corricida, *I.*, corn-cure.
 Corvalho, *P.*, oak-bark.
 Costras, *S.*, scabs.
 Coton cardé, *Fr.*, wadding, cotton wool.
 Coton hydrophile, *Fr.*, absorbent wool.
 Couchant, en se, *Fr.*, going to bed, lying down.

Coucher, *Fr.*, bedtime, going to bed. A prendre deux pilules avant le coucher. (Two pills to be taken at bedtime.)

Couro, *P.*, leather.

Cravagem de centeio, *P.*, ergot.

Cravinho, *P.*, cloves.

Cucchiaino da caffè, *I.*, coffeespoonful.

Cucchiaio, *I.*, spoonful.

Cucchiaio da tavola, *I.*, tablespoonful.

Cucharada, *S.*, spoonful.

Cucharada de postre, *S.*, dessert-spoonful.

Cucharada de sopa, *S.*, soup- or table-spoonful.

Cucharadita del té, *S.*, teaspoonful.

Cuero, *S.*, leather.

Cuidadosamente, *P.* and *S.*, carefully, accurately, cautiously.

Cuillerée à café, *Fr.*, teaspoonful.

Une cuillerée à café au cas d'une attaque de toux. (A teaspoonful to be taken if the cough comes on.)

Cuillerée à dessert, *Fr.*, dessert-spoonful.

Cuillerée à soupe, *Fr.*, tablespoonful. Prenez une cuillerée à soupe toutes les deux heures. (One tablespoonful every two hours.)

Cuillerée à thé, *Fr.*, teaspoonful.

Cuillerée ordinaire, *Fr.*, table-spoonful.

Cuir, *Fr.*, leather.

Cuoio, *I.*, leather.

Cuóre, *I.*, heart.

Cyanatum, *G.L.*, cyanidum, cyanide.

Cyanure, *Fr.*, cyanide.

D. S. Morgens, *Ger.*, label it, in the morning.

Da applicarsi dietro l' orecchio destro, *I.*, apply behind the right ear.

Da applicarsi leggermente prima di coricarsi, *I.*, to be applied lightly at bedtime.

Da applicarsi sulla eruzione cutanea, *I.*, to be applied to the eczematous rash.

Da bere, *I.*, drink.

Da sciogliersi, *I.*, dissolve.

Da somministrarsi, *I.*, to be administered.

Da strofinare con un panno il cuoio capellutto sera e mattina, *I.*, to be rubbed into the bare patches on the scalp night and morning.

Da usarsi localmente, *I.*, for local use only.

Da vicino, *I.*, near to.

Dagelijks, *D.*, from day to day.

Daglig, *N.*, daily.

Dasselbe, *Ger.*, the same.

De bonne heure demain, *Fr.*, early to-morrow.

De deitarse, á hora, *P.*, at bedtime.

De dia em dia, *P.*, from day to day.

De dia en dia, *S.*, from day to day.

De jour en jour, *Fr.*, from day to day.

De la façon habituelle, *Fr.*, in the usual manner.

De la façon prescrite, *Fr.*, in the manner directed.

De temps en temps, *Fr.*, occasionally.

De tres em 3 dias, *P.*, every third day.

De tres en tres dias, *S.*, every third day.

De vez em quando, *P.*, occasionally.

De vez en cuando, *S.*, occasionally.

Debolezza, *I.*, weakness.

- Dedaleira, *P.*, digitalis.
 Deitado, *P.*, poured, or lying down.
 Demain matin, *Fr.*, to-morrow morning.
 Demain soir, *Fr.*, to-morrow night.
 Den volgende morgen, *D.*, the following morning.
 Denti, *I.*, teeth.
 Dentur, *G.L.*, give.
 Depois, *P.*, after.
 Derecha, *S.*, right (hand).
 Despues, *S.*, after.
 Dessertlöffel, *Ger.*, dessertspoon.
 Deuterobromuretum hydrargyri, *G.L.*, mercuric bromide.
 Deuterioduretum hydrargyri, *G.L.*, mercuric iodide.
 Di giorno in giorno, *I.*, from day to day.
 Dicht bij, *D.*, near to.
 Diese Arznei darf nicht eingenommen werden, *Ger.*, not to be taken.
 Diez, *S.*, ten.
 Digeribile, *I.*, digestible.
 Direito lado, *P.*, right side.
 Dissoudre, *Fr.*, dissolve.
 Ditale, *I.*, finger-stall.
 Doce-amarga, *P.*, dulcamara.
 Doceie nasale, *I.*, nasal douche.
 Dolor, *S.*, pain.
 Dolore, *I.*, pain.
 Dománi, *I.*, to-morrow.
 Domani sera, *I.*, to-morrow night.
 Domattina, *I.*, to-morrow morning.
 Domattina presto, *I.*, early to-morrow.
 Dopo i pasti, *I.*, after meals.
 Dopo un' ora, *I.*, at the expiration of an hour.
 Doppio, *I.*, double.
 Dôr, *P.*, pain.
 Dormideiras, *P.*, poppy-capsules.
 Douce-amère, *Fr.*, dulcamara.
 Douleur, *Fr.*, pain.
 Dower'sches Pulver, *Ger.*, Dover's powder.
 Draaber, *N.*, drops.
 (À) Droit, *Fr.*, right.
 Droppels or Druppels, *D.*, drops.
 Durchfall, *Ger.*, diarrhoea.
 Eau blanche, *Fr.*, lotio plumbi.
 Eau de Rabel, *Fr.*, mistura sulphurica acida.
 Eau phagédénique, *Fr.*, lotio hydrarg. flav.
 Eau régale, *Fr.*, nitro-muriatic acid.
 Ebenfalls, *Ger.*, also.
 Echado, *S.*, poured, or lying down.
 Effet voulu, *Fr.*, the desired effect. Une cuillerée à café toutes les demi-heures jusqu'à l'effet voulu. (A teaspoonful every half-hour till it acts.)
 Eguale, *I.*, equal.
 Eichenrinde, *Ger.*, cortex quercûs.
 Eigelb, *Ger.*, yolk of an egg.
 Einblasen, *Ger.*, to insufflate.
 Eine, *Ger.*, a or an.
 Eine Stunde, *Ger.*, an hour.
 Eine Woche, *Ger.*, a week.
 Einreibung, *Ger.*, embrocation.
 Einspritzung, *Ger.*, injection.
 Einzugeben, *Ger.*, administer.
 Einzureiben, *Ger.*, to be rubbed in.
 Eisessig, *Ger.*, glacial acetic acid.
 Eiweiss, *Ger.*, white of an egg.
 El, *S.*, the (masculine).
 Emetico, *I.*, emetic.
 Emorroidi, *I.*, piles.
 Empiastro, *I.*, plaster.
 Emplastrum adhæsivum anglicum, *G.L.*, court plaster.
 Emplastrum picatum, *G.L.*, pitch plaster.

Emplâtre, *Fr.*, plaster.
 Emquanto dura a dôr, *P.*, while pain lasts.
 En medio de, *S.*, in the middle of.
 En se couchant, *Fr.*, lying down.
 Encima, *S.*, above.
 Encina, *S.*, oak-bark.
 Endro, *P.*, dill.
 Enjaugue, *S.*, gargle.
 Ensemble, *Fr.*, together.
 Enterochismo, *I.*, enema syringe.
 Entre, *Fr.*, *P.*, and *S.*, between.
 Enxofre, *P.*, sulphur.
 Erbrechen, *Ger.*, vomiting.
 Ernia, *I.*, rupture.
 Erupção, *P.*, the rash.
 Erupción, *S.*, rash.
 Erwärmt, *Ger.*, warmed.
 Esattamente, *I.*, accurately.
 Esfregar, *P.*, to rub.
 Espolvorear, *S.*, to sprinkle (with powder).
 Essen, *Ger.*, meals.
 Essenza, *I.*, volatile oil—*e.g.*, *essenza di trementina*, oil of turpentine.
 Essig, *Ger.*, vinegar.
 Esslöffel, *Ger.*, tablespoon. Alle zwei Stunden einen Esslöffelvoll. (A tablespoonful every two hours.)
 Estender, *P.*, to stretch, extend.
 Estratto d' orzo tallito, *I.*, extract of malt.
 Etere, *I.*, eter, *S.*, ether.
 Etichetta, *I.*, slip-label.
 Etiquette, *Fr.*, slip-label.
 Exactamente antes de retirar se para o descanso, *P.*, just before retiring.
 Exactamente antes de retirarse para dormir, *S.*, just before retiring.
 Ext. d. q.q. (extrait de quinquina), *Fr.*, cinchona extract.

Extender, *S.*, to spread.
 F.S.A. (Faites selon art), *Fr.*, make according to art.
 Faulbaumrinde, *Ger.*, cortex frangulæ.
 Febbre, *I.*, fever.
 Felce maschio, *I.*, male-fern.
 Ferrocyanatum, *G.L.*, ferrocyanide.
 Feto macho, *P.*, male-fern.
 Fiali, *I.*, ampoules.
 Filaccia, *I.*, lint.
 Filtro, *I.*, strain.
 Fino a, *I.*, up to.
 Fino a che dura il dolore, *I.*, while the pain lasts.
 Finocchio, *I.*, fennel.
 Fios de linho, or lichino, *P.*, lint.
 Fixirnatron, *Ger.*, sodium thio-sulphate.
 Flacon, *Fr.*, bottle. Le flacon ayant été agité. (The bottle having been shaken.)
 Flasche, *Ger.*, bottle. Schütteln Sie die Flasche. (Shake the bottle well.)
 Fliederthee, *Ger.*, elder-flowers.
 Flores benzoës, *G.L.*, benzoic acid.
 Flores naphæ, *G.L.*, orange-flowers.
 Flores zinci, *G.L.*, zinc oxide.
 Flüchtige Salbe, *Ger.*, lin. ammoniæ.
 Flüchtiges Salz, *Ger.*, ammonium carbonate.
 Fois, *Fr.*, time. Prenez en quatre fois à une demi-heure d'intervalle. (To be taken in four portions at intervals of half an hour.)
 Forfora, *I.*, dandruff.
 Fra mezzo, *I.*, between.
 Frasco, *S.*, bottle. Frasco de vidro bien tapado. (A well-stoppered bottle.)
 Freddo, *I.*, cold.
 Friction, *Fr.*, rub.

- Früh, *Ger.*, early.
 Fünf, *Ger.*, five.
 Fuori, *I.*, outside.
 Für innerlichen Gebrauch, *Ger.*, for internal use.
 Gange, *N.*, times — *e.g.*, tre gange daglig, three times a day.
 Garapifiado, *S.*, sugar-coated.
 Garganta, *S.* and *P.*, the throat.
 Gargarismo, *I.*, gargle.
 Garofani, *I.*, cloves.
 Garrafa bem agitada, *P.*, the bottle well shaken.
 Garza, *I.*, gauze.
 Gayuba, *S.*, bearberry.
 Gebruik, *D.*, apply.
 Gedurende het bruisen, *D.*, during effervescence.
 Gelegentlich, *Ger.*, occasionally.
 Gelijke deelen, *D.*, equal parts.
 Gelöst, *Ger.*, dissolved.
 Gemma d'um ovo, *P.*, yolk of egg.
 Genau, *Ger.*, accurately.
 Gentigen, *Ger.*, sufficiency.
 Gestern, *Ger.*, yesterday.
 Giacendo, *I.*, lying down.
 Giesta, *P.*, broom.
 Giornalmente, *I.*, daily.
 Giro, *S.*, draught.
 Girofles, *Fr.*, cloves.
 Giusquiamo, *I.*, henbane.
 Giusto, *I.*, right.
 Glas, *Ger.*, glass, tumbler.
 Glas sproite, *N.*, glass syringe.
 Gleiche Teile, *Ger.*, equal parts.
 In gleiche Teile zu teilen. (Let it be divided into equal parts.)
 Goccie, *I.*, drops (of liquid).
 Gotas, *P.* and *S.*, drops.
 Goudron, *Fr.*, tar.
 Gouttes, *Fr.*, drops. A prendre dix gouttes trois fois par jour. (Ten drops to be taken thrice daily.)
 Graines de lin, *Fr.*, linseed.
 Granatrinde, *Ger.*, cortex granati.
 Grasa de cerdo, *S.*, lard.
 Gurgelwasser, *Ger.*, gargle.
 Gürgles, *N.*, gargle.
 H.S.A., *S.* = F.S.A.
 Hacer, *S.*, to make.
 Haferschleim, *Ger.*, a thin oatmeal porridge.
 Halbstündig, *Ger.*, half-hourly.
 Halsen, *N.*, the throat.
 (La) Hanche, *Fr.*, the hip.
 Harn, *Ger.*, urine. Den Harn lassen, to urinate.
 Harnleiter, Harnzapfer, *Ger.*, catheter.
 Harnruhr, *Ger.*, diabetes.
 Harnstein, *Ger.*, stone in the bladder.
 Hasta que, *S.*, until.
 Helecho macho, *S.*, male-fern.
 Hervir, *S.*, to boil.
 Herz, *Ger.*, heart.
 Hiel, *S.*, bile.
 Hier, *Fr.*, yesterday.
 Hierro, *S.*, iron.
 Hilas de lino, *S.*, lint.
 Hinojo, *S.*, fennel.
 Hirschtalg, *Ger.*, mutton suet.
 Hoest, *de*, *D.*, the cough.
 Höllenstein, *Ger.*, silver nitrate lunar caustic.
 Hontem, *P.*, yesterday.
 Hosten, *N.*, cough. Nar hosten er slem. (When the cough is troublesome.)
 Hostia, *P.*, cachet or wafer.
 Houblon, *Fr.*, hops.
 Hüfte, *Ger.*, hip.
 Husten, *Ger.*, cough. Wenn der Husten belästigt. (When the cough is troublesome.)
 Hydricum, *Ger.*, hydrate.
 Ichtiocola, *S.*, isinglass.

Idrofilo, *I.*, absorbent.
 Ieri, *I.*, yesterday.
 Il bianco d' un' uovo, *I.*, white of an egg.
 In das Auge zu bringen, *Ger.*, to be placed in the eye.
 In der angegebenen Weise, *Ger.*, in the manner directed.
 In der gewohnten Weise, *Ger.*, in the usual manner.
 In gleiche Teile zu teilen, *Ger.*, divide into equal parts.
 Indien het hoesten lastig is, *D.*, when the cough is troublesome.
 Ingwer, *Ger.*, ginger.
 Iniezione, *I.*, injection.
 Inmediatamente, *S.*, immediately.
 Innerlich, *Ger.*, internal.
 Insieme, *I.*, together.
 Invece, *I.*, instead.
 Iodatum, *G.L.*, iodide.
 Iodicum, *G.L.*, iodate.
 Iodure, *Fr.*, iodide.
 Iodure de formyle, *Fr.*, iodoform.
 Ipochlorito, *I.*, hypochlorite.
 Ittiolo, *I.*, ichthyol.
 Já, *P.*, immediately.
 Jarabe, *S.*, syrup.
 Jaune, *Fr.*, yellow.
 Jaune d'œuf, *Fr.*, yolk of an egg.
 Jeden, *Ger.*, every.
 Jeden Abend, *Ger.*, every evening.
 Jeden Morgen, *Ger.*, every morning.
 Jeden zweiten Tag, *Ger.*, every other day.
 (A) Jeun, *Fr.*, fasting. Prenez deux ou trois de ces pilules à jeun. (Take two or three of these pills fasting.)
 Jicara, *S.*, cup.
 Jod, *Ger.*, iodine.
 Jusqu'à ce que, *Fr.*, up to.
 Jusqu'ame noire, *Fr.*, henbane.

Juste avant d'aller se coucher, *Fr.*, just before retiring to rest.
 Kaffeelöffelvoll, *Ger.*, coffeespoonful.
 Kali, *G.L.*, potash.
 Kalium, *G.L.*, potassium.
 Kamillen, *Ger.*, flor. chamom. matricar.
 Kinderlöffelvoll, *Ger.*, dessertspoonful.
 Kinderpulver, *Ger.*, pulv. rhei co.
 Klystier, *Ger.*, enema.
 Knochenmehl, *Ger.*, calcium phosphate.
 Kochend, *Ger.*, boiling.
 Kohlensäure, *Ger.*, carbonic acid.
 Kokend, *D.*, boiling.
 Kopje, *D.*, cup.
 Kühl, *Ger.*, cool. Stets kühl zu stellen. (To be kept cool.)
 Kümmel, *Ger.*, caraway.
 Kurz vor dem Schlafen gehen, *Ger.*, just before retiring to rest.
 L' anca, *I.*, the hip.
 La gola, *I.*, the throat ; mal di gola, sore throat.
 La mano, *I.*, the hand.
 La tosse, *I.*, the cough.
 Lachuga, *S.*, lettuce.
 Laten liggen, *D.*, lying down.
 Latte, *I.*, milk.
 Latwerge, *Ger.*, electuary.
 Lavagem de boca, *P.*, mouth-wash.
 Lavagem para os olhos, *P.*, eye-wash.
 Lavement, *Fr.*, enema. Donner un lavement à l'eau boriquée. (Give an enema of boric solution.)
 Laxieren, *Ger.*, to purge ; Laxiermittel, a purgative medicine.
 Leberthran, *Ger.*, cod-liver oil.
 Leder, *Ger.*, leather.
 Leinmehl, *Ger.*, crushed linseed.
 Lento, *I.*, slow.

- Limao, *P.*, lemon.
 Limonade sèche, *Fr.*, effervescent saline.
 Linho, *P.*, linseed.
 Linimentum volatile, *G.L.*, ammonia liniment.
 Liqueur de Belloste, *Fr.*, liquor hydrargyri nitratis acidus.
 Liquiritia, *G.L.*, glycyrrhiza.
 Liquor ammonii caustici, *G.L.*, ammonia solution.
 Lirio de los valles, *S.*, *Convallaria majalis*.
 Llegado, *S.*, arrived.
 Lo stesso, *I.*, the same.
 Löffel, *Ger.*, spoon.
 Lozione per i capelli, *I.*, hair-lotion.
 Lugar, *S.*, place.
 Macerieren, *Ger.*, macerate.
 Mad, *N.*, food. Efter Maden, after a meal.
 Magisterium bismuthi, *G.L.*, bismuth subnitrate.
 Mahlzeit, *Ger.*, meal.
 (La) Main, *Fr.*, the hand.
 Mais, *P.*, more.
 Mal, *Ger.*, time, portion. Auf vier Mal in halbstündigen Zwischenräumen zu nehmen. (To be taken in four portions at intervals of half an hour.)
 Mal di testa, *I.*, headache.
 Malva arborea, *G.L.*, *Althæa rosea*, hollyhock.
 Mañana por la mañana, *S.*, to-morrow morning.
 Mañana por la noche, *S.*, to-morrow night.
 Mandelöl, *Ger.*, almond oil.
 Mano, *I.* and *S.*, hand.
 Mano llena, *S.*, handful.
 Manteca, *S.*, lard or fat.
 Mão, *P.*, hand ; mão cheia, handful.
 Marmelo, *P.*, quince.
 Más, *S.*, more.
 Mavesygen, *N.*, stomach illness—*i.e.*, diarrhoea.
 Med, *N.*, with.
 Membrillo, *S.*, quince.
 (Le, la) Même, *Fr.*, the same.
 Mescolato, *I.*, mixed.
 Mesmo, *P.*, same.
 Messerspitze, *Ger.*, point of a knife.
 Messerspitzevoll, as much as will lie on a sixpenny-piece.
 Met mate, *D.*, by degrees.
 Metà, *I.*, half.
 Mezzogiorno, *I.*, midday.
 Middag, *N.*, midday.
 Mientras dura el dolor, *S.*, while the pain lasts.
 Mismo, *S.*, same.
 Mittagessen, *Ger.*, dinner (properly 'mid-day meal'). Dieses Pulver unmittelbar vor dem Mittagessen zu nehmen. (This powder to be taken immediately before dinner.)
 Moimendro, *P.*, henbane.
 Molto, *I.*, much.
 Mondspoeling, *D.*, mouth-wash.
 Morgen, *Ger.* and *N.*, morning.
 Morgens, in the morning. Morgen früh, to-morrow morning.
 Mostaza, *S.*, mustard.
 Muguet, *Fr.*, *Convallaria majalis*.
 Munden, *N.*, mouth.
 Mundwasser, *Ger.*, mouth-wash.
 Muy de mañana, *S.*, first thing in the morning.
 Na den maaltijd, *D.*, after meals.
 Naar, *N.*, when.
 Nach Bedarf, *Ger.*, if necessary.
 Nach Bericht, *Ger.*, as directed.
 Nach dem Essen, *Ger.*, after meals.
 Nach einer Stunde, *Ger.*, at the expiration of an hour.

- Nachdem man die Flasche umgeschüttelt hat, *Ger.*, the bottle having been first shaken.
- Nachmittag, *Ger.*, afternoon.
- Nahe, *Ger.*, near.
- Não, *P.*, not.
- Nariz, *S.*, nostril.
- Natrium, *G.L.*, sodium; Natrum, *G.L.*, soda, sodium oxide.
- Natro-kali tartaricum, *G.L.*, Rochelle salt.
- Ne pas avaler, *Fr.*, not to be taken.
- Nelken, *Ger.*, cloves.
- Nicht eingenommen werden, *Ger.*, not to be taken.
- Niederliegend, *Ger.*, lying down.
- Niet te gebruiken, *D.*, not to be taken.
- Nihilum album, *G.L.*, white tutty-powder, a mixture of zinc carbonate and oxide.
- Nihilum griseum, *G.L.*, grey tutty-powder.
- Nitricum, *G.L.*, nitrate.
- No, *S.*, not.
- No meio de, *P.*, in the middle of.
- Noche, *S.*, night.
- Noite, *P.*, night.
- Non più di quattro volte al giorno, *I.*, not more than four times a day.
- Notte, *I.*, night.
- Nüchtern, *Ger.*, sober, fasting.
Vier oder sechs von diesen Pillen nüchtern zu nehmen. (Four or six of these pills to be taken fasting, or before breakfast.)
- Nuit, *Fr.*, night.
- Nur, *Ger.*, only.
- Nur auf ärztliche Anweisung abzugeben, *Ger.*, to be given only on the medical man's direction.
- Nur für äusserlichen (or örtlichen) Gebrauch, *Ger.*, for local use only.
- O. a. ep. l. (olla alba epistomio ligneo), *G.L.*, a white pot with wood top.
- O. grisea, *G.L.*, earthenware pot.
- Oblate, *Ger.*, wafer. Ein Pulver vor der Mahlzeit in einer Oblate zu nehmen. (A powder to be taken in a wafer before meals.)
- Oblea, *S.*, wafer or cachet.
- Oertlich, *Ger.*, local.
- Oggi, *I.*, to-day.
- Ogni altro giorno, *I.*, every other day.
- Ogni due ore, *I.*, every two hours.
- Ogni mezz' ora, *I.*, every half-hour.
- Ogni quarto d' ora, *I.*, every quarter of an hour.
- Ogni sera, *I.*, every night.
- Ogni terzo giorno, *I.*, every third day.
- Ohne, *Ger.*, without.
- Olio di fegato di merluzzo, *I.*, cod-liver oil.
- Olio di mandorle dolci, *I.*, almond oil.
- Olmo, *P.*, elm.
- Omschudden, *D.*, (the bottle) to be well shaken.
- Onguent, *Fr.*, ointment.
- Onmiddellijk, *D.*, immediately.
- Oogwassching, *D.*, eye-wash.
- Ook, *D.*, also.
- Op de gebruikelijke wijze, *D.*, in the usual manner.
- Oplöses, *N.*, to be dissolved.
- Orden, or Pedido, *S.*, order.
- Ordonnance, *Fr.*, prescription.
- Orécchia, *I.*, ear.
- Oreja, *S.*, ear.
- Orelha, *P.*, ear.
- Orge perlé, *Fr.*, pearl barley.
- Orme champêtre, *Fr.*, elm.
- Ostia, or Sello, *S.*, cachet.
- Ottico, *I.*, optician.
- Ouate, *Fr.*, wadding, cotton wool.

- Oxalicum, *G.L.*, oxalsäures, *Ger.*, oxalate.
- Pain azyme, *Fr.*, wafer. Un de ces paquets à prendre dans du pain azyme avant le repas. (One of these powders to be taken in a wafer before meals.)
- Palo de campeche, *S.*, logwood.
- Paparraz, *P.*, stavesacre.
- Papel, *S.*, paper or powder.
- Paquet, *Fr.*, a packet, powder. A prendre un paquet toutes les deux heures. (One powder to be taken every two hours.) On prend un de ces paquets peu de temps avant l'attaque de fièvre. (One of these powders to be taken shortly before the fever fit.) Divis en paquets égaux No. 2. (Divide into two equal parts.)
- Par degrés, *Fr.*, by degrees.
- Para ser, *P.* and *S.*, to be.
- Paracalli, *I.*, corn-plasters.
- Parche, *S.*, plaster.
- Parpados, *S.*, eyelids.
- Pasta gummosa, *G.L.*, pâte de guimauve.
- Pastiglie, *I.*, lozenges.
- Pastiglie per la gola, *I.*, throat pastilles; *P.* p. la tosse, cough-lozenges.
- Pastillen, *Ger.*, lozenges. Man nimmt von diesen Pastillen auf einmal nur eine alle zwei Stunden. (One only of these lozenges to be taken every two hours.)
- Pastilles, *Fr.*, lozenges. A prendre de quatre à six pastilles par jour. (Four to six lozenges to be taken daily.)
- Paullinia, *Ger.*, guarana.
- Pavot, *Fr.*, poppy-capsules.
- Pece, *I.*, pitch.
- Pedido, *S.*, order.
- Pela manhã, *P.*, in the morning.
- Pelle, la, *I.*, the skin.
- Pellica, *P.*, kid leather.
- Pendant l'effervescence, *Fr.*, during effervescence.
- Pendant que la douleur dure, *Fr.*, while the pain lasts.
- Pennellare la gola ogni giorno mezz' ora dopo colazione, *I.*, paint the throat every day about half an hour after breakfast.
- Pennellature nasali con penello pelocammello, due volte al giorno, *I.*, apply to the nostrils with a camel-hair brush twice a day.
- Per applicare subito, *I.*, apply at once.
- Per l'uso esterno, *I.*, for external use.
- Per sciacquare la bocca, *I.*, mouth-wash.
- Perto, *P.*, near.
- Pesato, *I.*, weighed.
- Petto, *I.*, breast.
- Phosphoricum, *G.L.*, phosphate.
- Piacevole, *I.*, pleasant.
- Pierre à cautère, *Fr.*, caustic potash.
- Pildora, *S.*, pill.
- Pillen, *Ger.*, pills. Zwei Pillen jeden Abend vor dem Zubettgehen. (Two pills every evening at bedtime.)
- Pillole, *I.*, pill.
- Pilules, *Fr.*, pills. Deux pilules chaque soir avant le coucher. (Two pills every evening at bedtime.)
- Pincée, *Fr.*, a pinch. Infusez une pincée de ces herbes avec un demi-litre d'eau bouillante pour faire une tisane. (Infuse a pinch of these herbs in half a litre of boiling water to make a draught.)

Pincel, *S.*, pencil; pincelar, to paint.
 Pinsel, *Ger.*, a brush.
 Pinseln, *Ger.*, apply with a brush.
 Piombo, *I.*, lead.
 Pissenlit, *Fr.*, dandelion.
 Piumini di cigno, *I.*, powder-puffs.
 Piuttosto, *I.*, rather.
 Plaatselijk aan te wenden, *D.*, for local use only.
 Plätzchen, *Ger.*, lozenge.
 Pó, *P.*, powder.
 Poco poco, *I.*, little by little.
 Poco prima di coricarsi, *I.*, just before retiring to rest.
 Poignée, *Fr.*, handful.
 Polvere, *I.*, powder; *P.* Dower, pulv. ipecac. co.
 Polvero di riso, *I.*, rice-powder.
 Polvo, *S.*, powder.
 Pomata, *I.*, ointment.
 Poppatoio, *I.*, feeding-bottle.
 Por la mañana, *S.*, in the morning.
 Portacaustici, *I.*, caustic-holder.
 Potasse à la chaux, *Fr.*, caustic potash.
 Potion, *Fr.*, a draught or potion.
 Poudre, *Fr.*, powder. *Matin et soir une poudre dix minutes avant le repas.* (One powder every morning and evening ten minutes before meals.)
 Poudre alexitère, *Fr.*, pulv. ipecac. co.
 Poudre anodine, *Fr.*, pulv. ipecac. co.
 Poudre diaphorétique, *Fr.*, pulv. ipecac. co.
 Poudre gazeuse ou gazifère purgative, *Fr.*, seidlitz powder.
 Poudre gazogène, *Fr.*, effervescent or gazogene powder.
 Poudre gazogène laxative, *Fr.*, seidlitz powder.

Poudre gazogène neutre, *Fr.*, soda powder.
 Poudre Savory, *Fr.*, seidlitz powder.
 Poudre sudorifique, *Fr.*, pulv. ipecac. co.
 Pour être administré, *Fr.*, to be administered.
 Pour l'usage externe, *Fr.*, for external use.
 Pour l'usage partiel seulement, *Fr.*, for local use only.
 Pour placer dans l'œil, *Fr.*, to be placed in the eye.
 Pozione, *I.*, potion, draught.
 Pranzo, *I.*, dinner.
 Prendete, *I.*, you take.
 Près de, *Fr.*, near to.
 Presto, *I.*, quickly.
 Priser par le nez, *Fr.*, to snuff.
 Pour priser par le nez cinq ou six fois par jour. (To be snuffed five or six times daily.)
 Pulgarada, *S.*, a pinch.
 Pulver, *Ger.*, powder. *Ein Pulver jeden Morgen und Abend zehn Minuten vor dem Essen.* (One powder every morning and evening ten minutes before meals.) *Man nimmt ein Pulver kurz vor dem Fieberanfall.* (A powder to be taken shortly before the fever fit.)
 Pulvis aërophorus, *G.L.*, effervescent powder, gazogene powder, soda powder.
 Pulvis aërophorus laxans, *G.L.*, seidlitz powder.
 Pulvis gummosus, *G.L.*, gum acacia 5, liquorice 3, sugar 2.
 Pure, *I.*, also.
 Q.b., *I.*, a sufficient quantity.
 Q.b.p.f., *I.*, as much as is required to make.

- Q.s.p.f., *Fr.*, as much as is required to make.
- Quadril, *P.*, hip.
- Qualche, *I.*, some; qualche volte, sometimes.
- Quand la toux est gênante, *Fr.*, when the cough is troublesome.
- Quando la tosse arreca disturbo, *I.*, when the cough is troublesome.
- Quantité suffisante, *Fr.*, sufficiency.
- Quinquina, *Fr.*, cinchona.
- Quinte de toux, *Fr.*, a fit of coughing.
- Rabano rusticano, *S.*, horseradish.
- Raifort, *Fr.*, horseradish.
- Räucheressig, *Ger.*, toilet or disinfecting vinegar.
- Räucherkerzchen, *Ger.*, fumigating pastilles.
- Recht, *Ger.*, right.
- Refeições, *P.*, meals.
- Regaliz, *S.*, liquorice.
- Réglisse, *Fr.*, liquorice.
- Reiben, *Ger.*, rub.
- Reichsalz, *Ger.*, smelling-salts.
- Remède du capucin, *Fr.*, liquor hydrargyri nitratis acidus.
- Remède du duc d'Antin, *Fr.*, liquor hydrargyri nitratis acidus.
- Repas, *Fr.*, meals. Prendre une cuillerée à soupe au commencement de chaque repas. (A tablespoonful to be taken at the commencement of each meal.)
- Restregar, *S.*, to rub.
- Rezept, *Ger.*, prescription.
- Rhodomatum, *G.L.*, sulphocyanide.
- Rhodomel, *Fr.*, mel rosæ.
- Ricinusöl, *Ger.*, castor oil.
- Riechessig, *Ger.*, aromatic vinegar.
- Rince-bouche, *Fr.*, mouth-wash.
- Romeira, *P.*, pomegranate-bark.
- Ruhr, *Ger.*, dysentery.
- S.a. (selon avis), *Fr.*, as directed.
- Saar, *N.*, sore or wound. En glas sproite for saar, a glass syringe for wounds.
- Saccharum saturni, *G.L.*, lead acetate.
- Saindoux, *Fr.*, lard.
- Sal amarum, *G.L.*, magnesium sulphate.
- Sal mirabile, *G.L.*, sodium sulphate.
- Salbe, *Ger.*, ointment.
- Salmiak, *Ger.*, ammonium chloride.
- Salmiakgeist, *Ger.*, liquor ammoniæ.
- Salpetersäure, *Ger.*, nitric acid.
- Salpetersäures, *Ger.*, nitrate.
- Salzsäure, *Ger.*, hydrochloric acid.
- Sangsue, *Fr.*, leech.
- Sanguisuga, *P.*, a leech.
- Sanguiucla, *S.*, leech.
- Sapo kalinus, *G.L.*, potash or soft soap (made with linseed oil).
- Sapo viridis, *G.L.*, soft soap.
- Sauco, *S.*, elder-flower.
- Sauerstoff, *Ger.*, oxygen.
- Säure, *Ger.*, acid.
- Scatola, *I.*, box.
- Schlafengehen, *Ger.*, bedtime. Vor dem Schlafengehen zwei Pillen zu nehmen. (Two pills to be taken at bedtime.)
- Schmerz, *Ger.*, pain. So lange der Schmerz anhält. (While the pain lasts.)
- Schnupfen, *Ger.*, to snuff. Fünf bis sechs Mal im Tage zu schnupfen. (To be snuffed five or six times daily.) Der Schnupfen, a cold.
- Schütteln, *Ger.*, shake (*see* Flasche).
- Schwarzeswasser, *Ger.*, black wash, lotio nigra.
- Schwefel, *Ger.*, sulphur.

- Schwefelsäure, *Ger.*, sulphuric acid.
- Schwefelsäures, *Ger.*, sulphate.
- Schweffigesäure, *Ger.*, sulphurous acid.
- Schweffigsäures, *Ger.*, sulphurosum, *Ger.*, sulphite.
- Scioppo, *I.*, syrup.
- Se necessario, *I.*, if necessary.
- Sebum, *G.L.*, sebum, suet.
- Seife, *Ger.*, soap.
- Sel de Gregory, *Fr.*, morphine hydrochloride.
- Sel de lait, *Fr.*, milk sugar.
- Sello, *S.*, cachet.
- Sem, *P.*, without.
- Semaine, *Fr.*, a week.
- Semana, uma, *P.*, a week.
- Semana, una, *S.*, a week.
- Semencine, *Fr.*, santonica.
- Sen, *S.*, senna.
- Senf, *Ger.*, mustard.
- Sengetid, *N.*, bedtime.
- Senza, *I.*, without.
- Seringue, *Fr.*, syringe. Une petite seringue en verre. (A small glass syringe.)
- Sete, *I.*, thirst.
- Settimanalmente, *I.*, weekly.
- Seul, e, *Fr.*, alone.
- Sim, *P.*, yes.
- Sin, *S.*, without.
- Sir. d.e.o.A. (sirop d'écorces d'oranges amères), *Fr.*, syrup of bitter-orange peel.
- Siringha, *I.*, syringe.
- Sirop, *Fr.*, syrup.
- Sirop de mûres, *Fr.*, mulberry-syrup.
- Sitio, *P.*, place.
- Sitio or Lugar, *S.*, place.
- Sofort, *Ger.*, immediately.
- Soir, *Fr.*, evening.
- Solfo, *I.*, sulphur.
- Solvēt asses, *L.*, he pays; *e.g.*, s.a. quindecim—he pays 1s. 3d. (a Dutch method of indicating price on scrips).
- Som ordineret, *N.*, as directed or ordered.
- Sorbas, *S.*, by sips.
- Sorso, *I.*, draught.
- Sosa, *S.*, soda.
- Soufre, *Fr.*, sulphur.
- Soufre végétal, *Fr.*, lycopodium.
- Spazzola, *I.*, brush.
- Spazzolino da denti, *I.*, toothbrush.
- Spiseskefuld, *N.*, tablespoonful.
- Spritze, *Ger.*, syringe.
- Spugna, *I.*, sponge.
- Sputtachiera, *I.*, spitting-cup.
- Sted, *N.*, part. Angrebne sted, affected part.
- Sterilizzata, *I.*, sterilised.
- Stesso come primo, *I.*, same as before.
- Stets kühl zu stellen, *Ger.*, to be kept cool.
- Stibium, *G.L.*, antimonium.
- Stitichezza, *I.*, constipation.
- Streichen, *Ger.*, spread.
- Streupulver, *Ger.*, dusting-powder.
- Strychni semen, *G.L.*, nux vomica.
- Stuhlzäpfchen, *Ger.*, a suppository.
- Stunde, *Ger.*, hour.
- Subito, *I.*, quickly.
- Sublimat, *Ger.*, mercuric chloride.
- Sucre de Saturne, *Fr.*, lead acetate.
- Suero, *S.*, serum.
- Sughero turacciolo, *I.*, cork.
- Sulfur auratum, *G.L.*, sulphurated antimony.
- Sulfuratum, *G.L.*, sulphidum, sulphuretum, sulphide.
- Sulfuricum, *G.L.*, sulphas, sulphate.

Supposte, *I.*, suppositories.

Sureau, *Fr.*, elder-flower.

Syrupus diacodii, *G.L.*, syrup of poppies.

Table, *Fr.*, table. Se mettre à table. (To dine.) A prendre deux de ces pilules en se mettant à table. (Two pills to be taken before dining.)

Taça, *P.*, cup.

Taffetas d'Angleterre, *Fr.*, court plaster.

Täglich, *Ger.*, daily.

Tambem, *P.*, also.

Tambien, *S.*, also.

Tarassaco, *I.*, dandelion.

Tartarus boraxatus, *G.L.*, potassium boro-tartrate.

Tartarus depuratus, *G.L.*, potassium acid tartrate, cream of tartar.

Tartarus natronatus, *G.L.*, Rochelle salt, sodium potassium tartrate.

Tartarus stibiatus, *G.L.*, emetic tartar, antimonium tartaratum.

Tasse, *Fr.*, cup.

Tavola, *I.*, table.

Taza, *S.*, cup (drinking), or teacup.

Tazza, *I.*, cup.

Terpentinöl, *Ger.*, oil of turpentine.

Teskefuld, *N.*, teaspoonful.

Theelöffel, *Ger.*, teaspoon. Ein Theelöffelvoll, a teaspoonful.

Tid, *N.*, time. For en kort tid. (For a short time.)

Tinctura, *I.*, tincture.

Tinctura opii benzoica, *G.L.*, paregoric (tr. camph. co.).

Tinctura strychni, *G.L.*, tincture of nux vomica.

Tinctura thebaica, *G.L.*, tincture of opium.

Tisane, *Fr.*, draught, medicated drink, herb infusion.

Tisch, *Ger.*, table. Zu Tische gehen. (To dine.) Man nehme zwei von diesen Pillen wenn man zu Tische geht. (Take two pills before dining.)

Todos los dias, *S.*, daily.

Toma, *S.*, a portion to be taken.

Tomar, *S.*, to take.

Tos, *S.*, cough.

Tosse, *I.*, cough; tosse asinina, whooping-cough.

Tous les deux (or trois) jours, *Fr.*, every other (or third) day.

Tous les matins (or soirs), *Fr.*, every morning (or night).

Tous les quarts d'heure, *Fr.*, every quarter of an hour.

Toux, *Fr.*, cough. Quand la toux est gênante. (When the cough is troublesome.)

Tre volte al giorno, *I.*, three times a day.

Trebol acuatico, *S.*, buckbean.

Trementina, *S.*, pine turpentine.

Trifolium fibrinum, *G.L.*, Menyanthes trifoliata, buckbean.

Trois fois par jour, *Fr.*, three times a day.

Tropfen, *Ger.*, drop. Drei Mal des Tages zehn Tropfen zu nehmen. (Ten drops to be taken thrice daily.) 15-20 T. (Fifteen to twenty drops.)

Trovisco, *P.*, mezereon.

Trunk, *Ger.*, draught.

Tutte le mattine, *I.*, every morning.

Udvortes, *N.*, for external use.

Ueber, *Ger.*, above.

Um dia sim outro não, *P.*, every other day.

- Uma gota na palpebra inferior de cada olho, uma vez por dia, *P.*, a drop into the lower lid of each eye once daily.
- Uma hora sim, uma não, *P.*, every other hour (one hour yes, one no).
- Uma vez, *P.*, once.
- Umgeschüttelt, *Ger.*, to be shaken.
- Umschlag, *Ger.*, poultice.
- Umzuschütteln, *Ger.*, shake (the bottle). Vor dem Gebrauch umzuschütteln. (To be well shaken before use.)
- Un bicchiere da tavola, *I.*, wine-glass.
- Un dia sì y el otro no, *S.*, every other day.
- Un giorno sì e l' altro giorno no, *I.*, every other day.
- Un po' dopo, *I.*, a little after.
- Un torlo d'uovo, *I.*, yolk of an egg.
- Un' uovo, *I.*, an egg.
- Una goccia nella palpebra inferiore degli occhi, una volta al giorno, *I.*, a drop into the lower lid of each eye once a day.
- Una gota en el párpado inferior de cada ojo, una vez al día, *S.*, a drop into the lower lid of each eye once daily.
- Una hora sì y la otra no, *S.*, every other hour.
- Una manciata, *I.*, handful.
- Una settimana, *I.*, a week.
- Una vez, *S.*, once.
- Una volta, *I.*, once.
- Une fois, *Fr.*, once.
- Vaciar, *S.*, to pour off.
- Vaniglia, *I.*, vanilla.
- Vasar, *P.*, to pour off.
- Veleno, *I.*, poison.
- Venta, *P.*, nostril.
- Venti, *I.*, twenty.
- Verband, *Ger.*, bandage.
- Verbandwatte, *Ger.*, absorbent wool.
- Verdeeld in gelijke deelen, *D.*, let it be divided in equal parts.
- Verdünnt, *Ger.*, diluted.
- Verordnung, *Ger.*, prescription.
- Verre, *Fr.*, glass, tumbler. Un verre d'eau sucrée. (A tumbler of sugar and water.)
- Verre à madère, *Fr.*, wineglass.
- Versare, *I.*, pour off.
- Versez, *Fr.*, pour off.
- Vetro, *I.*, glass.
- Vez, cada, *P.*, each time.
- Vez, una, *S.*, once (one time).
- Vicino, *I.*, near.
- Ventre, *S.*, belly.
- Vier, *Ger.*, four.
- Vin chalibé, *Fr.*, vinum ferri citratiss.
- Vin estibiado, *S.*, antimonial wine.
- Vinum stibiatum, *G.L.*, antimonial wine.
- Von Tag zu Tag, *Ger.*, from day to day.
- Voor het naar bed gaan, *D.*, just before retiring to rest.
- Voor inwendig gebruik, *D.*, for internal use.
- Voor uitwending gebruik, *D.*, for outward application only.
- Vorsichtig, *Ger.*, with care.
- Wachholderbeeren, *Ger.*, juniper-berries.
- Während des Aufbrausens, *Ger.*, during effervescence.
- Waschmittel, *Ger.*, lotion.
- Wasserstoff, *Ger.*, hydrogen.
- Weinsteinsäure, *Ger.*, tartaric acid.
- Weise, *Ger.*, manner, way.

Wirkung, *Ger.*, action, effects.

Ein Theelöffelvoll alle halbe Stunden bis zur Wirkung zu nehmen. (Take a teaspoonful every half-hour till it acts.)

Woche, *Ger.*, week.

Xarope, *P.*, syrup.

Yema de huevo, *S.*, yolk of egg.

Zafferano, *I.*, saffron.

Zahnwurzel, *Ger.*, pellitory root.

Zenzero, *I.*, ginger.

Zeste, *Fr.*, the peel of oranges, lemons, &c.

Zettel, *Ger.*, a label.

Zimmt, *Ger.*, cinnamon.

Zittwersamen, *Ger.*, santonica.

Zolfo, *I.*, sulphur.

Zonder, *D.*, without.

Zoo noodig, *D.*, if necessary.

Zubereitet, *Ger.*, prepared.

Zubettegehen, *Ger.*, bedtime.

Zuckersäure, *Ger.*, oxalic acid.

Zuckerwasser, *Ger.*, sweetened water (sugar and water).

Zumo, *S.*, juice.

Zwei, *Ger.*, two.

Zwischen, *Ger.*, between.

ORDO RERUM.

The following are the regulations in force in the Dispensing Department of the Army and Navy Co-operative Society (Limited), 105 Victoria Street, London, reprinted here through the courtesy of Mr. L. Johnson, manager of the department.

REGULATIONS FOR DISPENSERS.

HOURS.—From 8.30 a.m. to 7 p.m. ; Saturdays, 3 p.m. ; after which times extra pay commences. Assistants are requested to be at their posts by 8.45 a.m. punctually. Each dispenser is to dust and arrange his own bottles, and to be ready to commence dispensing at 9 o'clock.

COPIERS.—When entering a prescription to observe the doses of the drugs, and if in excess of the Pharmacopœia dose to notify the head of the room ; also when the name on the prescription differs from that on the order, both names must be entered, and each day to enter the memos. from the ' Prescription Note-book.'

PERSONAL RESPONSIBILITY.—Dispensers are by law held liable for any serious mistake ; special attention is therefore called to the following instructions : The prescription, or a correct copy, to be in front of the dispenser, who should first consider the doses of the drugs. Each ingredient to be weighed or measured separately, and the bottle from which it was taken put back to its place at once. Read the label as the bottle or package is taken for use, and never fail, on returning it to its place, to see again that you have taken the right bottle or package. Re-read prescription immediately it is finished to make doubly sure that it has been correctly dispensed, and label each container with the prescription number before submitting to checker. The weighing or measuring of all poisons should be checked—if for a number of powders the bulk to be checked, and then weighed separately—the formula requiring them should be shown to the assistant called upon to check, who must initial the order against the quantity so entered. It is particularly requested that this regulation be strictly adhered to. Non-observance renders the dispenser

liable to instant dismissal. This applies to making preparations as well as dispensing.

Notes of excipients and other memos., including size of cachets used, are to be entered in a book kept for that purpose.

For all medicines for external use, or not to be taken, excepting non-poisonous gargles, mouth washes and sprays, special poison-bottles are to be used. Dispensing-bottles being liable to vary in capacity in reputed sizes, dispensers are to use bottles of correct capacity, the attention of the head of the room to be drawn to any discrepancies. Each dispenser shall check his own scales every morning and verify the weights on the first Thursday in each month; any discrepancy must be reported to the head of the room. He will be held responsible for the condition in which the bottles and jars are kept in the section allotted to him, anything missing or broken to be reported at once and entered on the order slate. All prescriptions are to be taken from the rack in the order they are arranged, and no fresh order shall be taken until the one in hand has been executed, unless such cannot be forthwith completed. Care must be taken to see that the number quoted on the order agrees with the name in the register; no alteration of an incorrect number to be made without reference to head of room. In dispensing foreign prescriptions, the Continental system is to be adopted.

PILLS, CACHETS, AND SUPPOSITORIES.—All ingredients to be weighed by a qualified dispenser, who must write out the formula in full on a separate slip, that it may be verified by the checker.

TO OBVIATE DELAY.—In every case where an order taken down by a dispenser cannot be executed forthwith, the cause of delay is to be noted in a book kept for that purpose; but as much of the order as can be done is to be proceeded with and passed on to the finisher.

CHECKERS.—To examine carefully in every detail the completed preparation, and not to pass same unless satisfied that it is correct in every respect; any negligence on the part of the dispenser to be reported to the head of the room.

FINISHERS will be held responsible for the correct entry of prescription in the register, a duplicate copy being furnished for the purpose of checking the original; they are also requested to note very carefully any alteration or addition made in a repeat prescription, also the correctness of the label, that it is neatly and distinctly written, the size and graduation of the bottle, and the quantity ordered to be made up to. To note that the name of the patient should be copied from the prescription; but should this bear no name, it must be obtained from the prescription-book. To be careful to insert distinctly the correct index of book and

number of prescription on the label (and to mark the price, together with the quantity in cases of powders and pills, and note when the latter are silvered or otherwise coated), also ticket number outside the medicine and envelope. The directions on labels of all potent medicines must be checked by a second person, who must initial the order.

POISON LABELS.—All preparations for external use containing poisons are to be labelled as such, and potent medicines for internal use to have a 'with care' slip put on the bottle.

POISONS.—Potent are to be kept in a cupboard quite apart from other drugs. Less potent on special shelves.

STOCKKEEPER.—All preparations made by him to be entered in the 'Stock Laboratory Book,' and the active ingredients to be checked by a qualified dispenser. All bottles filled from the 'Stock Poison-cupboard' only to be done under the supervision of the foreman in charge, who will initial same in a book kept for the purpose. To examine carefully all goods before taking into stock, and to see that they are properly labelled; and when the slightest deterioration is noticed, or any doubt arises, to refer to the manager at once.

In all cases of difficulty and doubt, employés are requested to apply to the head of room, who, if necessary, will consult the manager.

Talking (except on business connected with the department) is strictly prohibited.

REGULATIONS FOR COUNTER ASSISTANTS.

HOURS.—From 8.30 a.m. to 7 p.m.; Saturdays, 8.30 a.m. to 3 p.m.; after which times extra pay commences. Assistants are requested to be at their posts by 8.50 a.m. punctually, and at closing time shall not leave until after 6.5 p.m. (2.5 p.m. on Saturdays), and the cleaning up of the department not to commence until five or ten minutes after, and not then if many members are in the room.

CONDUCT.—To be most attentive and polite to all members, and when in doubt, from whatever cause, to obtain the assistance of a foreman.

STOCK.—Each assistant thoroughly to dust, examine, and replenish his stock, and keep it in a good saleable condition.

ORDERS.—No personal orders are to be taken unless the ticket number is quoted, and no obsolete numbers are to be accepted. Deposit Orders.—When such are not signed by the member in whose name the account stands, inquiry must be made at the Deposit Office, before parting with

the goods, whether the signature is authorised, and in such instances the address should be written under the signature of the person signing it. Deposit orders of the value of 10s. and over must be queried. All deposit bills are to be initialled by a foreman. Special Orders.—Articles to be specially obtained must be entered in special order-book immediately after receipt of order. Separate bills must be made out, and in all instances are to be signed by a foreman. Full particulars to be obtained when possible as to size, price, and maker's address.

ENCLOSURE CARDS.—Assistants, when taking send orders, are to interrogate if other purchases are being made, and, if so, to suggest the use of an enclosure card.

BILLS.—All bills are to be made out in a neat and legible manner, and when any alteration is required the original and duplicate, with the carbon paper, are to be placed in the book, and the alteration initialled by a foreman. When making out bills the initials of members and their rank or title should, when possible, be taken.

CASHIERS.—No communication whatever, either written or verbal, shall take place between cashier and counterman.

REPAIRS OR EXCHANGE.—No orders for repairs or goods exchanged are to be taken without a bill being made.

PACKING-CASES.—Members are to be asked, when ordering goods to be sent to the country, whether the goods should be sent in non-returnable cases or not, and if carriage paid. All goods sent to hotels, cloak-rooms, and yachts must be packed in non-returnable cases and charged for.

(SCHEDULE OF POISONS given here.)

The sale of 'poisons' enumerated in this schedule must in all instances be controlled by a qualified man. Any homœopathic medicines containing scheduled poisons stronger than the stock strength as published in list will come under the above regulations.

A detailed list of medicines affected by the Act is issued herewith for the guidance of assistants, and any infringement of the regulations will render the assistant liable to instant dismissal.

FOREMEN will be held responsible for the good conduct of the counter-men, the proper keeping of the stock, and for ensuring as far as possible that the regulations respecting the sale of poisons be strictly adhered to.

In all cases of difficulty and doubt, employés are requested to apply to the head of room, who, if necessary, will consult the manager.

These regulations to be retained for reference.

FOR SMALL PHARMACIES.

The following are rules actually in use in several pharmacies employing one to three assistants, and they may be found more applicable than the foregoing, which are specially intended for such places as the Stores.

PREPARING PRESCRIPTIONS.—Prescriptions must be prepared as soon as possible after they are received, and when a prescription is left to be compounded, and the customer says he will call for it at a certain time, every possible effort must be made to have it ready before the time specified.

Prescriptions must be dispensed with the greatest neatness and elegance. Corks should be sealed, the bottle or box neatly wrapped in white paper and sealed, and use flint bottles, porcelain jars, and the best quality of boxes. If the prescription has the name of the patient on it, write the name on the label.

DOUBTFUL PRESCRIPTIONS.—When a prescription is received about which there is doubt as to whether the physician intended it as written, or when there is reasonable doubt as to what is prescribed, do not dispense the medicine.

If the customer is not in haste, and time can be gained for the purpose, send to the doctor privately a note of inquiry, otherwise hand the prescription back to the customer and request him to see the doctor about it.

If the formula for a preparation used in a prescription is not uniform, or is liable to be compounded in various ways, the dispenser must write in the margin of the prescription the exact formula he has used.

UNSIGHTLY MIXTURES.—No unsightly or incompatible mixture is allowed to be sent out of this pharmacy until the principal's attention has been drawn to the same and every legitimate means tried to make a sightly and elegant compound.

PILLS.—In preparing a prescription of pills, mention in the prescription-book the kind and quantity of excipient used in compounding them; the same with suppositories.

BLISTERING-PLASTERS.—In preparing or spreading emp. canthar. always paint the plaster over afterwards with the ethereal solution of cantharidis. [This was before the B.P., 1914, officialised the Cantharidin preparation.—ED.]

RENEWALS.—In renewals the soiled labels must be renewed, and, if necessary, the bottle washed. This applies also to pills and powders. [Always give fresh containers if customer does not object.—ED.]

RESPONSIBILITIES.—Whoever dispenses a prescription in this pharmacy will be held personally responsible for any mistake in compounding. The fact of the wrong drug having been put in the shop-bottle by another assistant will not relieve the dispenser from responsibility, his duty being to examine critically every article he dispenses.

To avoid mistakes permit no talking while you are preparing prescriptions.

No substitution is permitted in prescriptions under any circumstances. Any article in a prescription which is not in stock must be procured, and the customer informed of delay.

POISONS.—Poisons to be taken internally may be labelled ‘Drop with care’ or ‘Use with caution.’ But, unless so directed by the physician, the word ‘Poison’ must not be written on the label.

PRICING.—When a high-price prescription has been put up, or one that seems dear according to its bulk, always explain to the customer that it is an expensive preparation, and that it is put at as low a price as possible.

The bottle or jar used in a prescription is always charged extra, and in entering the price on a prescription it must be for the medicine only, the bottle or jar being charged for according to the price-list.

PRESCRIPTION-COUNTER.—The prescription-assistant will see that his counters are kept perfectly clean and neat. As soon as a prescription is checked off return the hand-bottles to their places on the shelves and clean up all the utensils used.

ADDRESS OF PATIENT.—Inquire the name and address of every person who leaves a prescription to be prepared, and write it on the back of prescription in pencil.

MESSENGER.—When a child or a servant is sent for a prescription always write the price on the package in plain figures in ink.

PRICES OF GOODS SOLD TO PHYSICIANS.—If drugs or prescriptions for their own family use, charge them from one-half to two-thirds the regular price according to the medicine.

DISPENSING CHARGES.

THE following are the retail prices agreed upon by the Liverpool Chemists' Association, which we reproduce from the price-list compiled by the Association and published by Suttley & Silverlock, Ltd., Blackfriars, London, S.E., at 1s. 6d., or post free 1s. 8d. :—

Size	Mixtures and Drops for Internal Use				Lotions, Injections, and Gargles
	Dose, 5j.	Dose, 5ij.	Dose, 3ss.	Dose, 3j.	
3ss.	6d. to 8d.	6d. to 8d.	6d.	—	6d. to 8d.
3j.	8d. ,, 10d.	8d. ,, 10d.	6d. to 8d.	—	
3iss.	9d. ,, 1/-	8d. ,, 10d.	8d. ,, 9d.	—	8d. ,, 10d.
3ij.	9d. ,, 1/-	9d. ,, 1/-	9d. ,, 10d.	—	
3iij.	1/- ,, 1/6	10d. ,, 1/-	9d. ,, 1/-	8d. to 10d.	9d. ,, 1/-
3iv.	1/3 ,, 2/-	1/- ,, 1/6	1/- ,, 1/3	10d. ,, 1/-	
3vj.	1/6 ,, 2/3	1/3 ,, 1/9	1/- ,, 1/6	1/- ,, 1/4	10d. ,, 1/6
3viij.	1/9 ,, 2/6	1/6 ,, 2/-	1/3 ,, 1/9	1/- ,, 1/6	
3x.	—	—	1/6 ,, 2/-	1/3 ,, 1/9	1/- ,, 1/9
3xij.	—	—	1/9 ,, 2/3	1/6 ,, 2/-	
3xvj.	—	—	2/3 ,, 3/-	2/- ,, 2/6	1/6 ,, 2/6
3xx.	—	—	2/9 ,, 3/6	2/3 ,, 2/9	

No.	Pills	Powders	Cachets and Dry Capsules	Suppositories	Bougies and Pessaries
1	3d. to 6d.	3d. to 6d.	3d. to 6d.	—	1/- to 1/3
2 to 4	3d. ,, 6d.	6d. ,, 8d.	6d. ,, 8d.	9d.	
6	6d. ,, 8d.	8d. ,, 1/-	9d. ,, 1/-	1/-	1/6 ,, 2/-
12	10d. ,, 1/-	1/- ,, 1/6	1/3 ,, 1/6	1/6 to 2/-	2/6 ,, 3/6
18 to 24	1/- ,, 1/6	1/6 ,, 2/6	1/6 ,, 2/6	2/- ,, 3/-	—

Ointments, 3ss. to 3j., 8d. ; 3iss. to 3ij., 1s. to 1s. 6d. ; 3iij. to 3iv., 1s. 3d. to 2s. Electuaries the same. Pills, 6 doz., 3s. to 3s. 6d. ; 12 doz., 5s. to 5s. 6d.

Blisters and Belladonna or Opium Plasters, 3 by 4 inches, 8d. ; 4 by 4 inches, 10d. ; 4 by 6 inches, 1s. ; 5 by 8 inches, 1s. 6d. ; 6 by 9 inches, 2s. ; 6 by 12 inches, 2s. 6d. ; minimum, 6d.

Dispensing-fee for stock liniments, tinctures, &c., 3d. to 6d., in addition to retail prices.

CHARGES FOR DOCTORS' DISPENSING.—The usual charges are 1d. per ounce for mixtures, with a minimum of 4d. ; lotions are generally charged at lower rates than mixtures, but with the same minimum ; liniments are charged according to composition, a profit of 10 or 15 per cent. being added to the cost ; pills, 3d. a dozen ; and powders, 4d. a dozen. In all cases costly alkaloids as ingredients of the prescriptions justify extra charges.

METRIC WEIGHTS AND MEASURES.

THE following tables show the approximate equivalents which may be required at the dispensing-counter :—

AVOIRDUPOIS WEIGHT.

Oz.	Grammes	Grammes	Oz.	Gr.
$\frac{1}{4}$ =	7·09	10 =	$\frac{1}{4}$ and	45
1 =	28·35	20 =	$\frac{1}{2}$ „	90
3 =	85·05	50 =	$1\frac{3}{4}$ „	6
4 =	113·40	75 =	$2\frac{1}{2}$ „	64
5 =	141·75	100 =	$3\frac{3}{4}$ „	103
12 =	340·19	250 =	$8\frac{3}{4}$ „	30
20 =	566·99	500 =	$17\frac{1}{2}$ „	60
32 =	907·18	1,000 =	$35\frac{1}{4}$ „	10

APOTHECARIES' WEIGHT.

Grammes	Grammes
Gr. $\frac{1}{100}$ = 0·00065	0·004 = gr. $\frac{1}{16}$
Gr. $\frac{1}{64}$ = 0·001	0·01 = gr. $\frac{1}{6}$
Gr. $\frac{1}{30}$ = 0·0022	0·032 = gr. $\frac{1}{2}$
Gr. $\frac{1}{6}$ = 0·01	0·05 = gr. $\frac{3}{4}$
Gr. $\frac{1}{4}$ = 0·016	0·10 = gr. iss.
Gr. j. = 0·064	0·125 = gr. ij.
Gr. iss. = 0·1	0·15 = gr. iiss.
Gr. ij. = 0·129	0·20 = gr. iiij.
Gr. iiss. = 0·162	0·25 = gr. iv.
Gr. iiij. = 0·194	0·3 = gr. ivss.
Gr. iv. = 0·259	0·4 = gr. vj.
Gr. v. = 0·324	0·5 = gr. viiss.
Gr. vj. = 0·389	0·6 = gr. ix.
Gr. vij. = 0·454	0·8 = gr. xiiss.
Gr. ix. = 0·583	0·9 = gr. xiv.
Gr. xv. = 0·972	1·0 = gr. xvss.
℥j. = 1·296	2·0 = ℥ss. gr. j.
℥ss. = 1·944	2·5 = ℥ss. gr. viiiss.
℥j. = 3·888	3·0 = ℥ij. gr. vj.
℥iiss. = 5·832	5·0 = ℥j. gr. xvij.
℥ij. = 7·775	6·0 = ℥iiss. gr. iiss.
℥iiss. = 9·719	8·0 = ℥ij. gr. iiiiss.
℥iiij. = 11·663	10·0 = ℥iiss. gr. iv.
℥iv. = 15·551	12·0 = ℥iiij. gr. v.
℥v. = 19·439	15·0 = ℥iiss. gr. xxiss.
℥vj. = 23·327	25·0 = ℥vj. gr. xxvj.
℥vij. = 27·215	50·0 = ℥iiss. ℥iiss. gr. ij.

APOTHECARIES' WEIGHT—*continued.*

	Grammes		Grammes
ʒj.	= 31·103	75·0	= ʒij. ʒiij. gr. xviiss.
ʒij.	= 62·207	100·0	= ʒiij. ʒiiss. gr. xiiij.
ʒiij.	= 93·310	150·0	= ʒiv. ʒviiss. gr. v.
ʒviij.	= 248·828	175·0	= ʒv. ʒv. gr. ss.

LIQUID MEASURES.

	Cubic Centimetres		C.c.
mj.	= 0·059	0·10	= miss.
mij.	= 0·118	0·125	= mij.
miiss.	= 0·15	0·15	= miiss.
miiij.	= 0·178	0·20	= miiiss.
miv.	= 0·237	0·25	= miv.
mv.	= 0·296	0·3	= mv.
mvj.	= 0·355	0·4	= mviss.
mviiij.	= 0·474	0·5	= mviiiss.
mx.	= 0·592	0·6	= mx.
mxij.	= 0·710	0·8	= mxiiiss.
mxv.	= 0·888	0·9	= mxv.
mxv.	= 1·184	1·0	= mxvij.
mxv.	= 1·479	2·0	= ʒss. miv.
ʒss.	= 1·776	2·5	= ʒij. mij.
mxl.	= 2·368	3·0	= ʒss. mxvj.
mxlv.	= 2·664	5·0	= ʒj. mxxivss.
ʒj.	= 3·552	6·0	= ʒj. mxliss.
ʒiiss.	= 5·328	8·0	= ʒij. mxv.
ʒij.	= 7·103	10·0	= ʒiiss. mxviiij.
ʒiiss.	= 8·879	12·0	= ʒiij. mxxij.
ʒiij.	= 10·655	15·0	= ʒiv. mxiiiss.
ʒiv.	= 14·206	20·0	= ʒvss. mviiij.
ʒv.	= 17·758	25·0	= ʒvij. miiss.
ʒvj.	= 21·309	30·0	= ʒj. mxxvij.
ʒvij.	= 24·861	50·0	= ʒj. ʒvj. mv.
ʒj.	= 28·412	75·0	= ʒij. ʒv. mvij.
ʒiiss.	= 42·618	100·0	= ʒiiss. mix.
ʒij.	= 56·825	150·0	= ʒv. ʒij. mxiv.
ʒiij.	= 85·237	175·0	= ʒvj. ʒj. mxviss.
ʒiv.	= 113·649	200·0	= ʒvij. mxviiij.
ʒv.	= 142·061	250·0	= ʒviiij. ʒvj. mxxiiss.
ʒvj.	= 170·474	500·0	= ʒxviiss. mxlvij.
ʒviiij.	= 227·298	1,000·0	= ʒxxxv. ʒiiss. miv.
ʒxx.	= 568·245		

SOLUTION CHART.

(Grains in minims, see page 32.)

[illegible]

For amount of liquid to be made, see top horizontal line. For parts of medicament required, see first perpendicular column. For percentage strength, see second perpendicular column. Thus, to make five fluid ounces of a 10-per-cent. (1-12-in-10) solution of camphor requires 240 grains of the drug; to make 16 fluid ounces of one-tenth of 1 per cent. (1-12-in-1,000) solution of bichloride of mercury would require 8 grains of the drug.—*Year Book of Pharmacy*, 1912.

TABLE SHOWING THE ADULT DOSES IN ORDINARY CASES OF THE PRINCIPAL MEDICINAL AGENTS.

These are from the British Pharmacopœia of 1914 when they are given there. Those marked with an asterisk (*) are from other source

Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)	Solids by Weight ; Liquids by Measure	Grain s Min	Grammes or Mils. (c.c.)
Acetanilidum . . .	2 to 5	0.12 to 0.30	Æther (<i>single</i>) . . .	45 to 60	3.00 to 4.00
*Acetum ipecac., B.P.)	10 30	0.60 1.80	„ acetic(<i>repeated</i>)	15 30	1.00 2.00
„ scillæ . . .	5 15	0.30 1.00	„ „ (<i>single</i>) . . .	45 60	3.00 4.00
„ urginæ . . .	5 15	0.30 1.00	*Agaricin	1 1 1/2	0.016 1.00
Acid. acetic. dil. . .	30 60	2.00 4.00	Aloe	2 5	0.12 0.30
„ acetylal.	5 15	0.30 1.00	Aloinum	1/2 2	0.03 0.12
„ arsenios.	1/8 1/8	0.001 0.004	Alumen purificatum . .	5 10	0.30 0.60
„ benzoic.	5 15	0.30 1.00	* „ ferricum	5 10	0.30 0.60
„ boric.	5 15	0.30 1.00	Ammoniac. gum. . . .	5 15	0.30 1.00
* „ camphoric. . . .	10 20	0.60 1.20	*Ammonii arsenas . . .	1/8 1/8	0.006 0.003
„ carbol.	1 3	0.06 0.20	„ benzoas	5 15	0.30 1.00
„ carbol. liq.	1 3	0.06 0.18	„ bromid.	5 30	0.30 2.00
„ cathartic.	4 8	0.25 0.50	„ carbonas	3 10	0.20 0.60
* „ chrysophan. . . .	1/8 1/8	0.01 0.03	„ chlorid.	5 20	0.30 1.20
* „ cinnamic.	1/8 1/8	0.003 0.016	* „ phosphas	5 20	0.30 1.20
„ citric.	5 20	0.30 1.20	* „ sulphoichthy . . .	15 30	1.00 2.00
* „ filicic.	6 15	0.40 1.00	*Amyl nitris (<i>by mouth</i>)	1/2 1	0.03 0.06
* „ gallic.	5 15	0.30 1.00	* „ „ (<i>hypodermic</i>)	1 5	0.05 0.30
„ hydriod. dil. . . .	5 10	0.30 0.60	„ „ (<i>vapour</i>)	2 5	0.12 0.30
„ hydrobr. dil. . . .	15 60	1.00 4.00	*Amylen. hydras . . .	30 60	2.00 4.00
„ hydrochl. dil. . . .	5 20	0.30 1.20	*Amyli iodidum	30 75	2.00 5.00
„ hydrocyan. dil. . .	2 5	0.12 0.30	*Anarcotina	1 3	0.06 0.20
* „ „ Scheele's . . .	1 3	0.06 0.18	*Anilin. sulphas	1/2 3	0.03 0.20
„ lactic.	15 30	1.00 2.00	Antimonii oxid.	1 2	0.06 0.12
„ „ dil.	30 120	2.00 8.00	„ sulphurat.	1 2	0.06 0.12
„ nitric. dil.	5 20	0.30 1.20	„ tartarat.	1/2 1	0.03 0.06
„ nit. hydrochlor. } dil.	5 20	0.30 1.20	„ tartarat. (<i>emetic</i>)	1/2 1	0.03 0.06
* „ osmic. (1 p.c. sol.)	1 3	0.06 0.18	„ tartarat. (<i>diaphoretic</i>)	1/8 1/8	0.0025 0.008
* „ phosph. dil. . . .	5 20	0.30 1.20	*Apiol	3 6	0.20 0.40
* „ picric.	1/4 2	0.016 0.13	*Apocodein. hydro- chlor. (<i>hypoderm.</i>)	1/8 1/2	0.01 0.03
„ salicylic.	5 20	0.30 1.20	*Apocodein. hydro- chlor. (<i>by mouth</i>)	1/8 1	0.006 0.06
„ sulph. arom.	5 20	0.30 1.20	Apomorphin. hydro- chlor. (<i>hypoderm.</i>)	1/8 1/8	0.003 0.006
„ „ dil.	5 20	0.30 1.20	Apomorphin. hydro- chlor. (<i>by mouth</i>)	1/8 1/2	0.006 0.016
„ sulphuros.	30 60	2.00 4.00	Aqua laurocerasi	30 120	2.00 8.00
„ tannic.	5 10	0.30 0.60	*Argenti cyanidum . . .	1/8 1/8	0.001 0.003
„ tartaric.	5 20	0.30 1.20	„ nitras	1/2 1/2	0.016 0.03
* „ thyminic.	5 10	0.30 0.60			
*Aconitina	1/80 1/80	0.00015 0.00015			
Æther (<i>repeated</i>) . . .	15 to 30	1.00 to 2.00			

Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)	Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)
*Argenti oxid.	$\frac{1}{2}$ to 2	0.03 to 0.13	Catechu nigrum	5 to 15	0.30 to 1.00
*Arsenii bromidum	$\frac{1}{10}$ $\frac{1}{15}$	0.001 0.004	*Cephaelina (emetic)	$\frac{1}{15}$ $\frac{1}{2}$	0.005 0.01
" iodid.	$\frac{1}{10}$ $\frac{1}{15}$	0.003 0.012	*Cerii oxalas	2 10	0.12 0.60
Asafetida	5 15	0.30 1.00	Chloral formamid.	15 45	1.00 3.00
Atropina	$\frac{1}{100}$ $\frac{1}{100}$	0.0003 0.0006	" hydras	5 20	0.30 1.20
" sulph.	$\frac{1}{100}$ $\frac{1}{100}$	0.0003 0.0006	*Chlorodyn.	15 30	1.00 2.00
*Auri bromid., &c.	$\frac{1}{100}$ $\frac{1}{100}$	0.001 0.012	Chloroform.	1 5	0.06 0.30
" incr. to $\frac{1}{2}$	incr. to $\frac{1}{2}$	incr. to 0.03	*Chrysarobin.	$\frac{1}{10}$ 1	0.006 0.06
*Balsam. gurjun.	30 120	2.00 8.00	*Cinchonæ cort. pulv. . . .	5 60	0.3 4.00
" peruvian.	5 15	0.30 1.00	" Cinchonine salts	1 10	0.06 0.60
" tolutan.	5 15	0.30 1.00	*Cocæ fol. pulv.	30 120	2.00 8.00
Barbitonum	5 10	0.30 0.60	Cocaine salts	$\frac{1}{10}$ $\frac{1}{2}$	0.006 0.016
*Barii chloridum	$\frac{1}{2}$ 2	0.015 0.12	Codein.	$\frac{1}{2}$ 1	0.016 0.06
* " sulphid.	$\frac{1}{2}$ 1	0.03 0.06	" phosph.	$\frac{1}{2}$ 1	0.016 0.06
*Beberinæ sulph.	1 5	0.06 0.30	*Colchici corm. pulv.	2 5	0.10 0.30
*Belladon. fol. and } rad. pulv. }	1 5	0.06 0.30	*Colchicinum	$\frac{1}{100}$ $\frac{1}{10}$	0.0005 0.002
Benzaminæ lactas	$\frac{1}{2}$ $\frac{1}{2}$	0.008 0.03	*Colocynth. pulp. pulv. . . .	2 8	0.12 0.50
*Benzenum	5 10	0.30 0.60	*Confect. opii, B.P. '85 . . .	5 20	0.30 1.25
*Benzol.	5 10	0.30 0.60	" piperis	60 120	4.00 8.00
*Benzonaphthol	4 10	0.25 0.60	" scammon., B.P. '85 . . .	10 30	0.5 2.00
Beta-eucaine	See Benzaminæ lactas		" sennæ	60 120	4.00 8.00
Beta-naphthol	3 to 10	0.20 to 0.60	" sulphuris	60 120	4.00 8.00
Bismuth. carbonas	5 20	0.30 1.20	*Conii fol. pulv.	2 8	0.12 0.50
* " citras	2 5	0.12 0.30	*Coniina	$\frac{1}{15}$ 1	0.005 0.06
* " oxidum	5 20	0.30 1.20	*Convallamarin. (by mouth) .	$\frac{1}{2}$ 2	0.008 0.12
* " salicylas	5 20	0.30 1.20	" (subcutaneously)	$\frac{1}{10}$ $\frac{1}{2}$	0.005 0.02
* " subnitras	5 20	0.30 1.20	Copaiba	30 60	2.00 4.00
* " tannas	10 30	0.65 2.00	*Cornutine and salts } (per diem) }	1 1	0.01 0.016
*Bismutose	15 30	1.00 2.00	*Cotarninæ hydrochlor. . . .	$\frac{1}{2}$ $\frac{1}{2}$	0.02 0.03
Borax purificat.	5 15	0.30 1.00	*Coto cort.	1 8	0.05 0.50
*Bromal hydras	2 5	0.10 0.30	*Cotoin.	$\frac{1}{2}$ 2	0.03 0.12
*Brometone	5	0.30	*Creosoti carbonas, &c. . . .	5 20	0.30 1.20
*Bromidia	30 to 60	2.00 to 4.00	Creosotum	1 5	0.06 0.30
*Bromoform	$\frac{1}{2}$ 2	0.03 0.12	Cresol	1 3	0.06 0.18
*Bruclina and salts	$\frac{1}{15}$ $\frac{1}{2}$	0.006 0.03	Creta præparata	15 60	1.00 4.00
Butyl-chloral hydras	5 20	0.30 1.20	Cubeb. fruct. pulv.	30 60	2.00 4.00
Caffein.	1 5	0.06 0.30	*Cupri acetat.	$\frac{1}{15}$ $\frac{1}{2}$	0.006 0.03
" citras	2 10	0.12 0.60	* " chloridum	$\frac{1}{2}$ 2	0.016 0.12
" effervesc.	60 120	4.00 8.00	* " sulph. (astring.)	$\frac{1}{2}$ 2	0.016 0.12
* " hydrobrom.	1 4	0.06 0.25	" " (emetic)	5 10	0.30 0.60
* " sodio - sali- cylas (hypoderm.)	1 5	0.06 0.30	*Curar.	$\frac{1}{10}$ $\frac{1}{2}$	0.003 0.03
*Caffein. sodio - sali- cylas (by mouth)	2 15	0.12 1.00	Cusso	120 240	8.00 16.00
Calcii carbonas præc. . . .	15 60	1.00 4.00	*Cyllin	1 5	0.06 0.30
" chloridum	5 15	0.30 1.00	Decoct. acaciæ cort.	1 oz. 2 oz.	15.00 60.00
" hypophosph.	3 10	0.20 0.60	" agropyri	$\frac{1}{2}$ " 2 "	15.00 60.00
* " iodatum	1 3	0.06 0.20	" aloes comp.	$\frac{1}{2}$ " 2 "	15.00 60.00
" lactas	10 30	0.60 2.00	" gossypii rad. cort. . . .	$\frac{1}{2}$ " 2 "	15.00 60.00
* " peroxidum	3 8	0.20 0.50	* " granatocort., B.P. '98	$\frac{1}{2}$ " 2 "	15.00 60.00
" phosphas.	5 15	0.30 1.00	" hæmatoxyl.	$\frac{1}{2}$ " 2 "	15.00 60.00
Calx sulphurat.	$\frac{1}{2}$ 1	0.016 0.06	" ispaghulæ	$\frac{1}{2}$ " 2 "	15.00 60.00
*Cambogia	$\frac{1}{2}$ 2	0.03 0.12	" sappan	$\frac{1}{2}$ " 2 "	15.00 60.00
Camphor.	2 5	0.12 0.30	Diamorphinæ hydrochlor. . .	$\frac{1}{10}$ $\frac{1}{10}$	0.0025 0.0098
* " monobrom.	2 8	0.12 0.50	*Digitalin. amorph.	$\frac{1}{100}$ $\frac{1}{100}$	0.0006 0.0016
*Cannabinæ tannas	4 8	0.25 0.50	" xtl.	$\frac{1}{100}$ $\frac{1}{100}$	0.00026 0.0006
*Cantharis	$\frac{1}{15}$ $\frac{1}{2}$	0.005 0.03	Digitalis fol. pulv.	$\frac{1}{100}$ 2	0.03 0.12
*Capsici fruct. pulv.	$\frac{1}{2}$ 1	0.03 0.06	*Digitoxinum	$\frac{1}{100}$ $\frac{1}{100}$	0.00025 0.001
*Capsicin.	$\frac{1}{8}$ $\frac{1}{4}$	0.008 0.016	*Dionina	$\frac{1}{2}$ $\frac{1}{2}$	0.016 0.03
*Carbamid.	10 60	0.60 4.00			
*Carbo ligni	60 120	4.00 8.00			
Catechu	5 15	0.30 1.00			

Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)	Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)
Diuretin	10 to 20	0.6 to 0.12	*Ext. jaborandi liq., } B.P. '98.	5 to 15	0.30 to 1.00
*Duboisin. sulphas . . .	$\frac{3}{16}$ $\frac{1}{4}$	0.00025 0.001	" jalapæ. B.P. '98.	2 8	0.12 0.50
*Elaterrinum	$\frac{1}{10}$ $\frac{1}{10}$	0.002 0.006	" kavæ liq.	30 60	2.00 4.00
*Elaterrinum	$\frac{1}{10}$ $\frac{1}{10}$	0.006 0.03	" krameriæ	5 15	0.30 1.00
Embelia	60 240	4.00 16.00	" nucis vom. liq. . . .	1 3	0.06 0.18
*Emetinæ hydrochlor. } (expectorant)	$\frac{1}{100}$ $\frac{1}{10}$	0.0003 0.0012	" sicc.	$\frac{1}{2}$ 1	0.016 0.06
" hydrochlor. } (emetic)	$\frac{1}{10}$ $\frac{1}{8}$	0.006 0.03	" opii liq.	5 30	0.30 1.80
Ergota	15 60	1.00 4.00	" siccum	$\frac{1}{2}$ 1	0.016 0.06
*Ergotinina (alkaloid) .	$\frac{1}{200}$ $\frac{1}{10}$	0.0003 0.0015	" papaveris	2 5	0.12 0.30
Ergotinum (ext. ergotæ)	2 8	0.12 0.50	" pareiræ liq., } B.P. '98.	30 120	2.00 8.00
*Erythrol. tetranitras . .	$\frac{1}{2}$ 1	0.03 0.06	" physostig. B.P. '98	1 1	0.016 0.06
*Eserin. (alkaloid) . . .	$\frac{1}{100}$ $\frac{1}{10}$	0.0006 0.0012	" picrorhizæ liq. . . .	15 60	1.00 4.00
" sulphas	$\frac{1}{16}$ $\frac{1}{8}$	0.001 0.002	" rhei	2 8	0.12 0.50
*Eucaïne salts	$\frac{1}{10}$ $\frac{1}{2}$	0.006 0.03	" sarsæ liq., B.P. '98	120 240	8.00 16.00
Eucalypti gum.	5 20	0.30 1.20	" stramon., B.P. '98	$\frac{1}{2}$ 1	0.016 0.06
*Eucalyptol	1 4	0.06 0.25	" strophanthi	$\frac{1}{2}$ 1	0.016 0.06
Euonymin. (ext.) } euonym.)	1 2	0.06 0.12	" taraxaci	5 15	0.30 1.00
*Euphorin	3 6	0.20 0.40	" liq., B.P. '98	30 120	2.00 8.00
*Euquinine	3 15	0.20 1.00	" viburni prunifol. .	3 8	0.20 0.50
*Exalgin. (methyl- } acetanilide)	$\frac{1}{2}$ 2	0.03 0.12	" liq.	60 120	4.00 8.00
*Ext. aconiti (green). } B.P. '85	$\frac{1}{2}$ 1	0.016 0.06	Fel bovinum purif. . .	5 15	0.30 1.00
" aconiti rad. al- } coholic.	$\frac{1}{10}$ $\frac{1}{8}$	0.006 0.02	*Ferri arsenas	$\frac{1}{16}$ $\frac{1}{4}$	0.004 0.016
" agropyri liq.	60 120	4.00 8.00	" bromidum	2 5	0.12 0.30
" aloes	1 4	0.06 0.25	" carb. sacch.	10 30	0.60 2.00
" anthemidis, B.P. } '98	2 8	0.12 0.50	" citras	5 10	0.30 0.60
" belæ liq.	60 120	4.00 8.00	" et ammon. cit. . . .	5 10	0.30 0.60
" belladon. sicc.	$\frac{1}{2}$ 1	0.016 0.06	" et potass. tart. . . .	5 10	0.30 0.60
" vir., B.P. '98	$\frac{1}{2}$ 1	0.016 0.06	" et quinin. cit. . . .	5 10	0.30 0.60
" cannabis indicæ . . .	$\frac{1}{4}$ 1	0.016 0.06	" et strychninæ cit. .	1 3	0.05 0.20
" cascara sag. liq. . . .	30 60	2.00 4.00	" glycerophos.	1 5	0.05 0.30
" cum " sic- } cum	2 8	0.12 0.50	" oxalas	1 5	0.05 0.30
" cimicifugæ liq., } B.P. '98.	5 30	0.30 2.00	" phosph. sacch. . . .	5 10	0.30 0.60
" cinchonæ liq.	5 15	0.30 1.00	" pyrophosph.	2 8	0.10 0.50
" cocæ liq., B.P. '98	30 60	2.00 4.00	" sulphas	1 5	0.06 0.30
" colchici	$\frac{1}{2}$ 1	0.016 0.06	" exsicc.	$\frac{1}{2}$ 3	0.03 0.20
" " acet.	$\frac{1}{2}$ 2	0.03 0.12	Ferrum redactum . . .	1 5	0.06 0.30
" colocynth. co.	2 8	0.12 0.50	*Formin	5 15	0.30 1.00
" conii	1 4	0.06 0.25	*Fortoin	1 4	0.06 0.25
" digitalis, U.S.P. . . .	$\frac{1}{10}$ $\frac{1}{10}$	0.006 0.012	*Fuchsinum	$\frac{1}{2}$ 4	0.03 0.25
" ergotæ	2 8	0.12 0.50	*Galbanum gum. . . .	5 15	0.30 1.00
" liq.	10 30	0.60 1.80	*Gallæ pulvis.	10 20	0.60 1.20
" filicis liq.	45 90	3.00 6.00	*Gelsemina (alkaloid) .	$\frac{1}{16}$ $\frac{1}{8}$	0.0005 0.002
" gelsemii alcohol. . . .	$\frac{1}{2}$ 2	0.03 0.12	" hydrochlor.	$\frac{1}{10}$ $\frac{1}{10}$	0.001 0.003
" gentianæ	2 8	0.12 0.50	Glycerinum	60 120	4.00 8.00
" glycyrrhizæ liq. . . .	30 60	2.00 4.00	Glycer. pepsini	60 120	4.00 8.00
" gossypii rad.	30 60	2.00 4.00	*Glycogen.	$\frac{1}{2}$ 2	0.03 0.12
" cort. liq.	30 60	2.00 4.00	Guaiaci resin.	5 15	0.30 1.00
" grindeliæ liq.	10 20	0.60 1.20	Guaiacol.	1 5	0.06 0.30
" hamamel. liq.	5 15	0.30 1.00	" carb.	5 15	0.30 1.00
" hydrastis liq.	5 15	0.30 1.00	*Hamamelin	1 5	0.05 0.30
" hyoscyami	2 8	0.12 0.50	" Heroin. hydrochlor. .	$\frac{1}{16}$ $\frac{1}{8}$	0.0025 0.008
" ipecac. liq. } (expect.)	$\frac{1}{2}$ 2	0.03 0.12	Hexamina	5 15	0.30 1.00
" " (emetic)	15 20	1.00 1.30	Homatropine salts . .	$\frac{1}{16}$ $\frac{1}{8}$	0.001 0.002
			Hydrarg. iod. rub. . .	$\frac{1}{16}$ $\frac{1}{8}$	0.002 0.004
			" virid.	$\frac{1}{16}$ 1	0.01 0.06
			" oxid. rub.	$\frac{1}{16}$ 2	0.004 0.016
			" perchlorid.	$\frac{1}{16}$ $\frac{1}{8}$	0.002 0.004
			" subchlorid.	$\frac{1}{2}$ 5	0.03 0.30
			" tannas	1 2	0.06 0.12
			" c cretæ	1 5	0.06 0.30
			*Hydrastine	$\frac{1}{2}$ 1	0.015 0.06

Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)	Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)
*Hydrastine salts . . .	$\frac{1}{4}$ to 1	0.015 to 0.06	Liq. morphin. acet. . .	10 to 60	0.60 to 3.60
Hyoscin. hydrobrom. . .	$\frac{1}{32}$ to $\frac{1}{8}$	0.0003 to 0.0006	" " bime- . . .	5 40	0.30 2.40
Hyoscyaminæ sulph. . .	$\frac{1}{32}$ to $\frac{1}{8}$	0.0003 to 0.0006	" " con. (r.p.c.) . . .	5 40	0.30 2.40
*Ichthyol ammon. . .	15 30	1.00 2.00	" morphin. hydro- chlor. . .	10 60	0.60 3.60
Infus. buchu . . .	1 oz. 2 oz.	30.00 60.00	" " tartrat. . .	10 60	0.60 3.60
" digitalis . . .	2 dr. 4 dr.	7.00 15.00	* " opii sed. . . .	5 20	0.30 1.20
" ergotæ . . .	1 oz. 2 oz.	30.00 60.00	" pancreatis . . .	60 120	4.00 8.00
" scoparii . . .	1 " 2 "	30.00 60.00	" potassæ . . .	10 30	0.60 1.80
" sennæ (repeated) . .	$\frac{1}{2}$ " 1 "	15.00 30.00	" potass. permang. .	2 dr. 4 dr.	7.00 15.00
" " (single) . . .	2 oz.	60	* " sodæ . . .	15 60	1.00 4.00
All other infusions of the B.P. . .	$\frac{1}{2}$ oz. to 1 oz.	15.00 to 30.00	" " chlorinat. . .	10 20	0.60 1.20
*Ingluvin . . .	5 to 20	0.30 1.20	" sodii arsenat. . .	2 8	0.12 0.50
Injectio apomorph. hypo. . .	5 10	0.30 0.60	" strychn. hydroch. .	2 8	0.12 0.50
Injectio cocain. hypo. " ergotæ " . . .	5 10	0.30 0.60	* " thyoidei . . .	5 15	0.30 1.00
" morphin. " . . .	5 10	0.30 0.60	" trinitrini . . .	$\frac{1}{2}$ 2	0.03 0.12
" strychnin. " . . .	5 10	0.30 0.60	* Lithii bromidum . .	5 15	0.30 1.00
*Iodipin . . .	30 60	2.00 4.00	" carbonas . . .	2 5	0.12 0.30
Iodoform.	$\frac{1}{2}$ 3	0.03 0.20	" citras . . .	5 10	0.30 0.60
*Iodum	$\frac{1}{16}$ $\frac{1}{4}$	0.004 0.016	" " effervesc. . .	60 120	4.00 8.00
Ipecac. pulv. (expect.) " " (emetic) . . .	$\frac{1}{2}$ 2	0.03 0.12	* " formas . . .	3 10	0.20 0.65
*Iridin	1 3	0.05 0.20	" " glycerophos. . .	5 15	0.30 1.00
Ispaghula	45 150	3.00 10.00	* " guaiacas . . .	2 5	0.10 0.30
*Jaborandi	5 60	0.30 4.00	" " hippuras . . .	5 10	0.30 0.65
Jalapæ pulv.	5 20	0.30 1.20	" " iodium . . .	1 5	0.05 0.30
" resina	2 5	0.12 0.30	* Lupulin.	2 5	0.10 0.30
Kaladana	30 45	2.00 3.00	Magnes. levis and pond. and carb. . .	30 60	2.00 4.00
" resina	2 8	0.12 0.50	" " " (single) " " " (repeated) . .	5 20	0.30 1.20
*Kamala	30 120	2.00 8.00	Magnes. sulphas (single) " " (repeated) . . .	120 240	8.00 16.00
Kino	5 20	0.30 1.20	" " sulphas efferv. vesc. (single) . . .	30 90	2.00 6.00
" eucalypti	5 20	0.30 1.20	" " " (repeated) vesc. (single) . . .	240 480	16.00 32.00
*Lactucarium	2 6	0.12 0.40	Magnes. sulphas. efferves. (repeated) .	60 180	4.00 12.00
*Lecithin	3 8	0.20 0.50	*Manganes.ox.nig.præc.	2 8	0.10 5.00
*Leptandrin (purgative) (alterative)	2 5	0.10 0.30	Menthol.	$\frac{1}{2}$ 2	0.03 0.12
Liq. adrenalin. hydroch. " ammoniæ	$\frac{1}{4}$ $\frac{1}{2}$	0.016 0.032	Methyl salicylas . . .	5 15	0.30 1.00
" " ammon. acet. . . .	10 30	0.60 1.80	*Methylene blue . . .	1 5	0.05 0.30
" " cit.	10 20	0.60 1.20	Methylsulphonal . . .	10 20	0.60 1.20
" " arsenicalis	2 dr. 6 dr.	8.00 24.00	Mist. ammoniaci . . .	$\frac{1}{2}$ oz. 1 oz.	15.00 30.00
" " arsenici hydroch. . .	2 " 6 "	8.00 24.00	" amygdalæ	$\frac{1}{2}$ " 1 "	15.00 30.00
" " arsenii et hyd. } iodid.	2 8	0.12 0.50	" cretæ	$\frac{1}{2}$ " 1 "	15.00 30.00
" " atropinæ sulph. . .	2 8	0.12 0.50	" ferri comp.	$\frac{1}{2}$ " 1 "	15.00 30.00
" " bism. et amm. cit. .	5 20	0.30 1.20	" guaiaci	$\frac{1}{2}$ " 1 "	15.00 30.00
* " calcli chlorid. . . .	5 20	0.30 1.20	" ol. ricini	1 " 2 "	30.00 60.00
" " calcis	1 " 2 "	0.03 0.06	" sennæ co.	1 " 2 "	30.00 60.00
" " sacch.	30 60	2.00 4.00	Morphinæ acet. . . .	$\frac{1}{2}$ " 1 "	0.008 0.03
" " chlori	15 45	1.00 3.00	" " bimeconas . . .	$\frac{1}{2}$ " 1 "	0.008 0.03
" " ethyl. nitrit. . . .	1 oz. 4 oz.	30.00 120.00	" " hydrochlor. . .	$\frac{1}{2}$ " 1 "	0.008 0.03
" " ferri acet., B.P. '98	15 60	1.00 4.00	* " sulphas	$\frac{1}{2}$ " 1 "	0.008 0.03
" " dialysat.	15 20	1.00 2.00	" " tartras	$\frac{1}{2}$ " 1 "	0.008 0.03
" " perchlor.	15 60	1.00 4.00	Moschus	5 10	0.30 0.60
" " permit.	5 15	0.30 1.00	* Muscarin. nit. . . .	$\frac{1}{2}$ $\frac{1}{2}$	0.03 0.045
" " B.P. '98	5 15	0.30 1.00	Myrobalanum	30 60	2.00 4.00
* " hamamelid.	5 15	0.30 1.00	Myrrha	5 15	0.30 1.00
" " hydrarg. perchlor. .	30 180	1.80 12.00	*Naphthalin	3 12	0.20 0.80
" " hydrogen. per- oxid.	30 60	2.00 4.00	*Naphthol.	3 10	0.20 0.60
" " magnes. bicarb. . .	30 120	2.00 8.00	*Narceina	$\frac{1}{2}$ 1	0.03 0.06
	1 oz. 2 oz.	30.00 60.00	*Narcotina	1 3	0.05 0.20
			*Niccoli bromidum . .	1 5	0.05 0.30
			" " sulphas	$\frac{1}{2}$ 2	0.03 0.10

Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)	Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)
*Nicotina	$\frac{1}{2}$ to $\frac{1}{2}$	0.0025 to 0.03	*Potass. glycerophos. .	5 to 10	0.30 to 0.60
*Nitroglycerin. . . .	$\frac{1}{100}$ to $\frac{1}{10}$	0.00025 to 0.001	* " hypophosph. .	1 5	0.06 0.30
Nux vomica pulv. . .	1 4	0.06 0.25	" iodid.	5 20	0.30 1.20
Ol. chaulmoogræ . . .	5 60	0.30 4.00	* " lactas	5 15	0.30 1.00
" copaibæ	5 20	0.3 1.20	" nitras	5 20	0.30 1.20
" crotonis	$\frac{1}{2}$ 1	0.03 0.06	* " nitris	$\frac{1}{2}$ 1	0.016 0.06
" cubebæ	5 20	0.30 1.20	" permangan. . . .	1 3	0.06 0.20
" gaultheriæ	5 15	0.30 1.00	* " salicylas	5 30	0.03 2.00
" morrhuæ	60 240	4.00 16.00	" sulphas	15 45	1.00 3.00
" phosphoratum . . .	1 5	0.06 0.30	" tartras	30 240	2.00 16.00
" ricini	60 480	4.00 30.00	" " acid.	15 60	1.00 4.00
* sabinæ	1 4	0.06 0.24	Pulv. antimonialis . .	3 6	0.20 0.40
" santali	5 30	0.30 1.80	" buteæ sem.	10 20	0.60 1.20
" terebinth. rect. . .	2 10	0.12 0.60	" catechu co.	10 60	0.60 4.00
" " (anthe- mintic)	180 240	12.00 15.00	" cinnam. co.	10 60	0.60 4.00
Most other B.P. essential oils	$\frac{1}{2}$ 3	0.03 0.18	" cretæ aromat. . .	10 60	0.60 4.00
Opium	$\frac{1}{2}$ 2	0.03 0.12	" " opio "	10 60	0.60 4.00
Oxymel	30 120	2.00 8.00	* " elaterini co., B.P. '98	1 4	0.06 0.25
" scillæ	30 60	2.00 4.00	" glycyrrh. co. . . .	60 120	4.00 8.00
" urginæ	30 60	2.00 4.00	" ipecac. co.	5 15	0.30 1.00
Paraffinum liq. . . .	60 240	4.00 16.00	" jalapæ co.	10 60	0.60 4.00
*Pancreatin	3 10	0.20 0.60	" kaladanæ co. . . .	10 60	0.60 4.00
*Papain	2 10	0.10 0.60	" kino co.	5 20	0.30 1.20
Paraldehydum	30 120	2.00 8.00	" opii co.	5 15	0.30 1.00
*Pelletierina	3 6	0.20 0.40	" rhei co.	10 60	0.60 4.00
" salts	2 8	0.12 0.50	" scammon. co. . . .	10 20	0.60 1.20
Pepsinum	5 10	0.30 0.60	" trag. co.	10 60	0.60 4.00
*Periodates	1 5	0.06 0.30	*Quininæ arsenas . .	$\frac{1}{16}$ $\frac{1}{8}$	0.004 0.008
Phenacetin	5 15	0.30 1.00	* " camphoras . . .	1 10	0.05 0.60
Phenazonum	5 15	0.30 1.00	* " citras	1 10	0.05 0.60
*Phenocoll. hydrochlor.	5 10	0.32 0.65	* " glycerophos. . .	1 10	0.05 0.60
Phenolphthalein. . .	2 5	0.12 0.30	* " hydriod.	1 5	0.05 0.30
Phosphorus	$\frac{1}{100}$ $\frac{3}{32}$	0.0006 0.0025	* " hydrobrom. . . .	1 10	0.05 0.60
*Physostigm. sem. . .	$\frac{1}{10}$ 2	0.03 0.12	" hydrochlor.	1 10	0.06 0.60
" alkaloid	$\frac{1}{100}$ $\frac{1}{10}$	0.0006 0.0012	" " acid.	1 10	0.06 0.60
" salts	$\frac{1}{100}$ $\frac{3}{32}$	0.001 0.002	* " hypophos.	1 5	0.05 0.30
Picrohiza	10 20	0.60 1.20	* " phosphas	1 6	0.06 0.35
" (antiperiodic) . . .	45 60	3.00 4.00	" sulphas	1 10	0.06 0.60
Picrotoxin.	$\frac{1}{100}$ $\frac{3}{32}$	0.0005 0.0025	* " sulphocarb. . . .	1 6	0.06 0.35
Pilocarpin. nit. . . .	$\frac{1}{100}$ $\frac{1}{4}$	0.003 0.012	" tannas	1 10	0.05 0.60
*Pil. conii co.	5 10	0.30 0.60	Resin. guaiaci	5 15	0.30 1.00
" ferri	5 15	0.30 1.00	" jalapæ	2 5	0.12 0.30
" phosphori	1 4	0.06 0.25	" podophylli	$\frac{1}{4}$ 1	0.016 0.06
" plumbi & opio . . .	2 4	0.12 0.25	" " indicii	$\frac{1}{4}$ 1	0.016 0.06
" quinin. sulph. . . .	2 8	0.12 0.50	" scammon.	4 8	0.25 0.50
" saponis co.	2 4	0.12 0.25	Resorcinum	1 5	0.06 0.30
All other pills in B.P.	4 8	0.25 0.50	Rheum pulv. (single). .	15 30	1.00 2.00
*Piperazin.	5 15	0.30 1.00	* " (repeated) . . .	3 10	0.20 0.60
*Piperina	2 8	0.10 0.60	Rosanilin. hydrochlor.	$\frac{1}{2}$ 4	0.03 0.25
Plumbi acet.	1 5	0.06 0.30	*Sabadilla	4 6	0.25 0.38
*Potassa sulphurata . .	2 8	0.12 0.50	*Sabinæ cacum. pulv. .	5 10	0.30 0.60
Potass. acetas	15 60	1.00 4.00	Salicinum	5 20	0.30 1.20
* " arsenas	$\frac{3}{10}$ $\frac{1}{10}$	0.003 0.006	*Salipyrin.	15 30	1.00 2.00
* " benzoas	15 20	1.00 1.30	Salol	5 20	0.30 1.20
" bicarb.	5 30	0.30 2.00	Santonin.	1 3	0.06 0.20
" bichromas	$\frac{1}{10}$ $\frac{1}{4}$	0.006 0.012	*Scammonia rad. pulv.	5 10	0.30 0.60
" bromid.	5 30	0.30 2.00	" resina	4 8	0.25 0.50
" carbonas	5 20	0.30 1.20	*Scammonium	5 10	0.30 0.60
" chloras	5 15	0.30 1.00	Scilla pulv.	1 3	0.06 0.20
" citras	15 60	1.00 4.00	*Scopolamin. hydro-	$\frac{1}{100}$ $\frac{1}{100}$	0.0003 0.000
* " formas	1 5	0.06 0.32	brom.		

Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)	Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)
Sodii arsenas anhyd. . .	$\frac{1}{10}$ to $\frac{1}{10}$	0.0015 to 0.006	Spt. menth. pip. . .	5 to 20	0.30 to 1.20
" benzoas . . .	5 30	0.30 2.00	" myristicæ . . .	5 20	0.30 1.20
" bicarbonas . . .	5 30	0.30 2.00	* " rosmarini . . .	5 30	0.30 2.00
" bromid. . . .	5 30	0.30 2.00	Strontii bromidum . .	5 30	0.30 2.00
" carbonas . . .	5 30	0.30 2.00	* " cinnamas . . .	2 5	0.10 0.30
" " exciscat. . .	3 10	0.20 0.60	* " glycerophos. . .	3 8	0.20 0.50
* " cinnamas . . .	2 5	0.10 0.30	* " iodidum . . .	5 15	0.30 1.00
* " citras	10 60	0.50 4.00	* " lactas	5 30	0.30 2.00
" cit. tart. efferves. .	60 120	4.00 8.00	* " salicylas . . .	5 15	0.30 1.00
" et potassii tart. . .	120 240	8.00 16.00	* Strophanthin. . . .	$\frac{1}{100}$ $\frac{1}{100}$	0.0002 0.0003
* " formas	10 45	0.60 3.00	Strychnina	$\frac{1}{4}$ $\frac{1}{4}$	0.001 0.004
* " glycerophos. . .	5 10	0.30 0.60	" salts	$\frac{1}{4}$ $\frac{1}{4}$	0.001 0.004
* " hippuras . . .	5 30	0.30 2.00	* Succus belladonnæ . .	5 15	0.30 1.00
" hypophosph. . . .	3 10	0.20 0.60	* " conii	60 120	4.00 8.00
" hypsulphis	5 20	0.30 1.20	* " digitalis	5 10	0.30 0.60
" iodid.	5 20	0.30 1.20	* " hyoscyami . . .	30 60	1.80 3.60
* " nitras	5 20	0.30 1.20	" scoparii	60 120	4.00 8.00
" nitris	2 0.03	0.12	" taraxaci	60 120	4.00 8.00
" phosphas (single) . .	150 240	10.00 16.00	Sulphonat.	10 30	0.60 2.00
" " (repeated) . . .	30 120	2.00 8.00	Sulphur præc. . . .	20 60	1.20 4.00
" " acidus	30 60	2.00 4.00	" sublim.	20 60	1.20 4.00
" " eff.	150 240	10.00 16.00	Syrupus cascara arom. .	30 120	2.00 8.00
" " (single)			" chloral.	30 120	2.00 8.00
" " eff.	60 120	4.00 8.00	" codeinæ phos. . . .	30 120	2.00 8.00
" " (repeated) . . .			* " papav.	30 60	2.00 4.00
" salicyl.	10 30	0.60 2.00	" rhei	30 120	2.00 8.00
" sulph. (single) . . .	150 240	10.00 16.00	" sennæ	30 120	2.00 8.00
" " (repeated) . . .	30 120	2.00 8.00	All the other		
" " effervesc. . . .	150 240	10.00 16.00	syrups in B.P. . . .	30 60	2.00 4.00
" " (single)			Terebenum	5 15	0.30 1.00
" " effervesc. . . .	60 120	4.00 8.00	* Terebinthina chia . .	5 10	0.30 0.60
" sulphis.	5 20	0.30 1.20	* Tetronal	10 20	0.60 1.20
* sulphocarb.	5 15	0.30 1.00	* Thallinæ sulph. . . .	3 5	0.20 0.30
" taurocholas	2 6	1.00 4.00	* Theobromina and salts	5 10	0.30 0.60
* valerianas	1 5	0.05 0.30	" et sodii	10 20	0.60 1.20
* Solurol	5 10	0.30 0.60	salicylas		
" "	1 2	0.06 0.12	* Thorium salts	1 5	0.06 0.30
* Spartein. sulph. . .	or more	or more	Thymol	$\frac{1}{2}$ 2	0.03 0.12
Spt. ætheris (single) .	60 to 90	4.00 to 6.00	" (anthelmintic) . . .	15 30	1.00 2.00
" " (repeated) . . .	20 40	1.20 2.50	Thyroid. (dry)	2 4	0.03 0.25
* " " co., B.P. . . .	60 90	4.00 6.00	Tinctura aconiti . . .	2 5	0.12 0.30
* " " '98 (single) . . .	20 40	1.20 2.50	" "	1 2	0.06 0.12
* " " co., B.P. . . .	20 40	1.20 2.50	" (Fleming's)	45 120	3.00 8.00
" " '98 (repeated) . .	15 60	1.00 4.00	* " " aloes (single) . .	30 60	1.80 3.60
" ætheris nitrosi . . .	60 90	4.00 6.00	" " (repeated) . . .	5 15	0.30 1.00
" ammon. arom. . . .	20 40	1.20 2.50	* " belladonnæ	1 10	0.05 0.60
" " (single)	20 40	1.20 2.50	" bryoniæ	5 15	0.30 1.00
" " arom.	60 90	4.00 6.00	" cannab. ind.	2 5	0.12 0.30
" " (repeated) . . .	20 40	1.20 2.50	" cantharidini	5 15	0.30 1.00
" " fetid.	60 90	4.00 6.00	" capsici	5 15	0.30 1.00
" " (single)	20 40	1.20 2.50	" chlorof. et		
" " fetid.	20 40	1.20 2.50	morph. co.)	5 15	0.30 1.00
" " (repeated) . . .	5 20	0.30 1.20	" cocci	5 15	0.30 1.00
" anisi	60 120	4.00 8.00	" colchici	5 20	0.30 1.20
" armorac. co. . . .	5 20	0.30 1.20	* convallariæ	5 15	0.30 1.00
" cajuputi	5 20	0.30 1.20	" croci	5 15	0.30 1.00
" camphor.	30 40	2.00 2.50	" daturæ sem.	5 15	0.30 1.00
" chloroformi (single) .	5 20	0.30 1.20	" digitalis	5 30	0.30 1.80
" " (repeated) . . .	5 20	0.30 1.20	* " ergotæ	10 20	0.60 1.20
" cinnamomi	5 20	0.30 1.20	* " ferri acet.	5 15	0.30 1.00
" juniperi	5 20	0.30 1.20	" " perchlor.	5 15	0.30 1.00
" lavandulæ	5 20	0.30 1.20	" gelsemii	5 15	0.30 1.00
			" iodi mitis	2 5	0.12 0.30

Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)	Solids by Weight ; Liquids by Measure	Grains or Minims	Grammes or Mils. (c.c.)
*Tinctura lobeliæ . . .	5 to 15	0.30 to 1.00	*Triphenin	5 to 15	0.30 to 1.00
" " æther.	5 15	0.30 1.00	Turpethum	5 20	0.30 1.20
" nucis vom.	5 15	0.30 1.00	*Uranii nit.	1 5	0.05 0.30
" opii (single)	20 30	1.20 1.80	*Ureæ quinas.	3 8	0.20 0.50
" " (repeated)	5 15	0.30 1.00	*Urethanum	15 30	1.00 2.00
" podophylli	5 15	0.30 1.00	Urginea	1 3	0.06 0.20
" "	5 15	0.30 1.00	*Veratrina	$\frac{1}{10}$ $\frac{1}{8}$	0.001 0.004
" "	5 15	0.30 1.00	Vinum antimon. . . .	10 30	0.60 1.80
" rhei co.	120 240	8.00 16.00	(diaph.)		
" rhei co.	30 60	2.00 4.00	" " (emetic)	120 240	8.00 16.00
" (repeated)	30 60	2.00 4.00	* " cocæ	120 240	8.00 16.00
* " sabinæ	20 60	1.20 4.00	" colchici	10 30	0.60 1.80
" scillæ	5 15	0.30 1.00	" ferri and cit.	60 240	4.00 16.00
" sennæ co.	120 240	8.00 16.00	" ipecac. (expect.) . . .	10 30	0.60 1.80
" (single)	120 240	8.00 16.00	" " (emetic)	240 360	16.00 24.00
" sennæ co.	30 60	2.00 4.00	* " opii	10 30	0.60 1.80
" (repeated)	30 60	2.00 4.00	" quininæ	240 480	16.00 30.00
" stramonii	5 15	0.30 1.00	Zinci acetat.	1 2	0.06 0.12
" strophanthi	2 5	0.12 0.30	* " bromidum	2 5	0.10 0.30
" urginæ	5 15	0.30 1.00	* " citras	3 12	0.20 0.80
" veratri viridis	5 30	0.30 2.00	* " lactas	1 3	0.06 0.20
" zingiberis	5 20	0.30 1.20	" oxid.	3 10	0.2 0.60
fort.	5 20	0.30 1.20	" phosphid.	$\frac{1}{10}$ $\frac{1}{8}$	0.003 0.015
Most other tinc- tures in the B.P. }	30 60	2.00 4.00	" sulphas (tonic)	1 3	0.06 0.20
*Trimethylaminæ hydrochlor.	1 5	0.06 0.30	" " (emetic)	10 30	0.60 2.00
			" valerianas	1 3	0.06 0.20
			*Zingiber pulv.	5 15	0.30 1.00

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* * Arranged as far as possible according to British Pharmacopœia or Latin names. Abbreviations which are familiar to dispensers are freely used. It will be noticed that the alphabetical arrangement is employed in preceding chapters so far as medicines are concerned.

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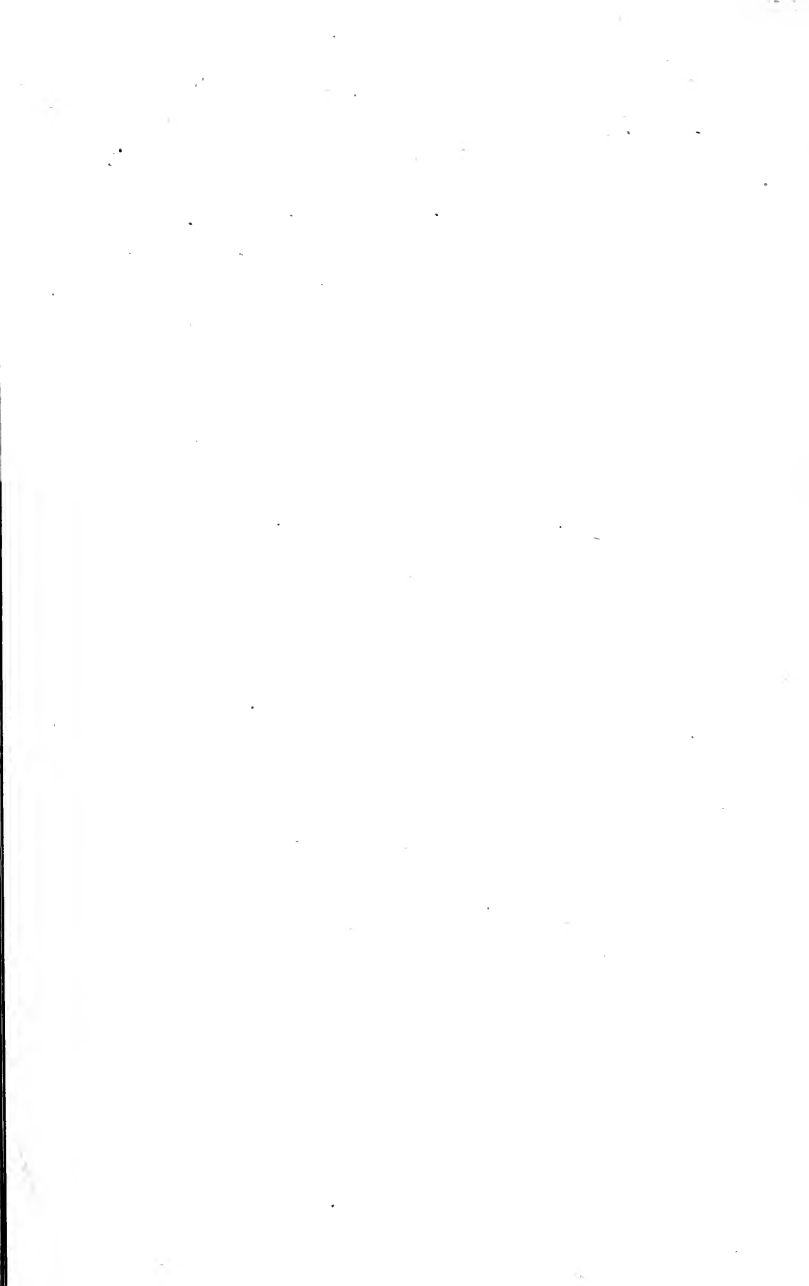
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